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SAFETY, MODERNIZATION, AND ENVIRONMENTAL CLEANUP OF THE U.S. NUCLEAR WEAPONS COMPLEX

HEARINGS

BEFORE THE

COMMITTEE ON ARMED SERVICES

AND THE

SUBCOMMITTEE ON
STRATEGIC FORCES AND NUCLEAR DETERRENCE

OF THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

FEBRUARY 2; MARCH 2; APRIL 6, 7, 1989

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SAFETY, MODERNIZATION, AND ENVIRONMENTAL CLEANUP OF THE U.S. NUCLEAR WEAPONS COMPLEX

THURSDAY, FEBRUARY 2, 1989

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

SAFETY ISSUES AT THE SAVANNAH RIVER REACTORS

The committee met, pursuant to notice, at 10:03 a.m., in room SR-222, Russell Senate Office Building, Senator J. James Exon, presiding.

Committee members present: Senators Exon, Nunn (chairman of the committee), Bingaman, Glenn, Gore, Warner, Thurmond, Cohen, Wallop, Gorton, and Lott.

Also present: Senator Robb.

Committee staff members present: Andrew S. Effron, general counsel; Sherri Wasserman Goodman, William E. Hoehn, Jr., T. Kirk McConnell, professional staff members.

Minority staff members present: Patrick A. Tucker, minority staff director and counsel; Robert F. Bott, professional staff member.

Staff assistants present: Tiffany E. Berger and Mickie Jan Wise.

Committee members' assistants present: Jeffrey B. Subko, assistant to Senator Exon; Gregory J. Weaver, assistant to Senator Levin; William J. Lynn, assistant to Senator Kennedy; Edward M. McGaffigan, Jr., assistant to Senator Bingaman; Milton D. Beach, assistant to Senator Glenn; Terrence M. Lynch, assistant to Senator Shelby; James M. Bodner, assistant to Senator Cohen; Mark J. Albrecht, assistant to Senator Wilson; Tony Cordesman, assistant to Senator McCain; Jack D. Crouch II, assistant to Senator Wallop; Christine Dawson, assistant to Senator Gorton.

OPENING STATEMENT OF SENATOR J. JAMES EXON, CHAIRMAN

Senator EXON. The committee will please come to order.

This morning, the Armed Services Committee begins a series of hearings, continuing on our efforts of last year, on the safety, modernization and environmental cleanup of the Nation's Nuclear Weapons Complex.

These facilities, which are managed by the Department of Energy, are located at some 15 sites across this country. Almost all were built in the 1940s and 1950s, and all reflect the industrial technology of that era.

These facilities need urgently—and I can't underline that any more than to say it again—need urgently to be replaced, consolidated, and modernized, so that they can continue to meet the needs of our nuclear deterrent forces in the 21st century.

We also need to clean up the environmental contamination that has been created at many of these sites. This contamination results largely from old methods of disposing of the hazardous substances, methods that are no longer acceptable under today's new environmental laws.

These facilities must be brought into compliance with the applicable environmental laws.

Finally, we must begin to decontaminate and decommission obsolete facilities.

Recent events have brought to the fore three basic realities about our Nation's defense nuclear facilities:

First, the Nuclear Weapons Complex is essential to the maintenance of the U.S. nuclear deterrent.

Second, the management of the Nuclear Weapons Complex must be safe and environmentally sound, and the cost-effective manner in which we must do this is critical to U.S. national security interests.

Third, the cleanup of environmental contamination and replacement of aging facilities is an urgent national priority.

The 101st Congress will have to make many difficult and painful decisions about the Nuclear Weapons Complex. The price tag for the cleanup and modernization over the next 20 years has been estimated in a recent report by the President to be over $80 billion, in addition—in addition—to the annual funding level of approximately $8 billion.

Many believe the actual costs will be even higher, and cleanup efforts will have to continue beyond the year 2010. This means that to put in place a reasonable program for cleanup and modernization will require increasing the budget of the Department of Energy's defense programs by $3 billion to $4 billion a year. That is a 50-percent increase, or is 50 percent more, than the current funding level, and well above what the outgoing Reagan administration budget has requested for fiscal year 1990 and fiscal year 1991.

In addition, it is not clear that money alone will correct all of these problems. Much of the technology and preliminary characterization work on the cleanup has yet to be developed. We cannot know how and where to modernize unless we know what we want the Nuclear Weapons Complex to look like 20 years from now. That is an integral part of the problem.

We must guard against merely throwing money at a problem in lieu of establishing realistic plans and overseeing their implementation.

The management of the Nation's Nuclear Weapons Complex must reflect its importance to the country. These facilities should be "centers of excellence"—models of sophisticated management and skill.

The Armed Services Committee looks forward to working with the new administration in establishing these "centers of excellence" throughout the complex.

This afternoon, the committee will receive testimony from the Department of Energy on plans for modernizing and cleaning up the Nuclear Weapons Complex.

The committee will be hearing from others on this subject in the near future.

In the coming weeks, the committee will conduct a closed hearing with members of the Nuclear Weapons Council on tritium requirements and capabilities. The committee will also conduct hearings on environmental restoration, with emphasis on how to set priorities for cleanup funds, with Government and outside witnesses. We expect to hold numerous hearings on these and other matters prior to any markup.

This morning, we will review the safety status of the Savannah River reactors. These reactors are the Nation's only source of tritium over the next decade, until new facilities can become operational.

Tritium, as you all know, is a perishable gas, which must be periodically replaced to maintain our nuclear deterrent forces. The Savannah River reactors have been shut down since last year, when operator errors prompted DOE to review its practices and procedures.

Since then, DOE has developed a plan for restarting one of the reactors by the end of the year. Unfortunately, the former Secretary of Energy was unable to persuade the White House to provide the funds needed to improve reactor safety. We do not yet know whether the Bush administration intends to request such funds.

Since these reactors will have to operate safely for a number of years, it is obvious that we have to proceed aggressively, but never giving in to any concerns whatsoever about safety.

When requested, it is important that funds not be combined with other projects, whose funding may not be so urgently needed.

Last year, as far as the Defense Authorization Act, this committee drafted and the Congress ultimately passed legislation establishing the Defense Nuclear Safety Board. This five member Board is charged with reviewing the safety of operations throughout the Nuclear Weapons Complex and making recommendations for its improvement. The first nominees to this Board are due in March.

The Armed Services Committee encourages the President to name qualified individuals in a timely manner and will ensure that their confirmation hearings are conducted swiftly.

We are pleased to have with us this morning a distinguished panel of witnesses. The Department of Energy is represented by Mr. Troy Wade, the Acting Assistant Secretary for Defense Programs, and Mr. Richard Starostecki—and I hope I have pronounced that right—the Deputy Assistant Secretary for Safety, Health, and Quality Assurance.

Mr. Wade, the committee has asked you to appear at a number of the hearings, and we want you to know that we are grateful for your tireless public service during a very difficult time. You are to be commended for your dedication and your hard work.

We are sorry that Mr. Peter Brush cannot join us today and we wish him a speedy recovery.

We are also pleased to have with us Dr. John Ahearne, Chairman of the DOE's Advisory Committee on Nuclear Facility Safety.

Dr. Ahearne, we thank you for being with us here today.

I would also like to enter into the record the correspondence of your Advisory Committee, including a letter report on the restart strategy for the K reactor.

I ask at this time, without objection, that that material be inserted into the record.

Senator EXON. Without objection, it is so ordered.

[The information follows:]

Advisory Committee on Nuclear Facility Safety
to the
United States Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

December 14, 1988

Honorable Sam Nunn
Chairman
Committee on Armed Services
United States Senate
Washington, D.C. 20510

Re: Advisory Committee on Nuclear Facility Safety Report on the DOE Production Reactors

Dear Mr. Chairman:

By the National Defense Authorization Act for fiscal year 1988 you initiated formation of the National Research Council's Committee to Provide Interim Oversight of the DOE Weapons Complex. Important elements of the weapons complex are the production reactors and the nuclear material process facilities. The Secretary of Energy has formed the Advisory Committee on Nuclear Facility Safety to provide independent safety review of the Department of Energy's nuclear reactors, including the production reactors, and the nuclear material process facilities. In order to provide you timely information on safety issues within the weapons complex , a division of labor has been agreed to between the DOE Advisory Committee on Nuclear Facility Safety and the National Research Council's Committee to Provide Interim Oversight of the DOE Weapons Complex. The Advisory Committee is providing information on the production reactors. The National Research Council's Committee is reporting on the balance of the weapons complex

Description of the Advisory Committee on Nuclear Facility Safety

The Advisory Committee on Nuclear Facility Safety was established by the Secretary of Energy in response to a recommendation made by the National Research Council's Committee to Assess Safety and Technical Issues at DOE Reactors.* In establishing the Advisory Committee, the Department of Energy met all aspects of the National Research Council's recommendation which included:

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*Committee to Assess Safety and Technical Issues at DOE Reactors, Safety Issues at the Defense Production Reactors - A Report to the U. S. Department of Energy, National Academy Press, Washington, D.C., 1987.

- Members are of recognized stature with expertise covering the full range of disciplines relevant to reactor safety.
- Membership includes individuals from outside the DOE community.
- The Advisory Committee has the authority to set its own agenda.
- The Advisory Committee has the authority to review both the production and process efforts of the Department of Energy including review of design, safety analysis, operation, management, inspection and enforcement.
- The Advisory Committee is supported by a full-time, technically qualified staff and a budget adequate to obtain external technical assistance as required.
- The bulk of the Advisory Committee's work is unclassified and available to the public.

Membership and affiliations of the Advisory Committee are shown in Table 1. Continuity with past reviews is achieved since three members of the Advisory Committee were also members of the National Research Council's Committee to Assess Safety and Technical Issues at DOE Reactors and two members also serve on the National Research Council's Committee to Provide Interim Oversight of the DOE's Weapons Complex.

Members work part-time on the Advisory Committee. They provide peer review and, as recommended by the National Research Council, an assurance that the Department of Energy is aware of and utilizes the most up-to-date safety technology in its operation of nuclear facilities.

Work by the Advisory Committee began in May 1988. Subcommittees have been established to examine 1) the return to full power of the Savannah River reactors, 2) safety assessments of the new production reactors, 3) the use of probabilistic safety assessments in the DOE weapons complex, 4) quality assurance, 5) radiological safety, 6) safety issues at the nuclear material process facilities, 7) safety issues at the Fast Flux Test Facility, and 8) the restart of Savannah River reactors. Subcommittees will be formed as issues are identified and found to require in depth examination by members and consultants. The full Advisory Committee meets approximately monthly and provides reports to the Secretary of Energy on a timely basis.

Safety and Technical Issues at the Production Reactors

There are two production reactor facilities in the DOE weapons complex--the N-reactor located in Richland, Washington and the Savannah River reactors located near Aiken, South Carolina. The N-reactor is currently shut down and being "moth-balled" in cold standby. It will not be a producer of nuclear materials in the near term. Remaining activities at the N-reactor

Table 1. Membership and Affiliations of the Advisory Committee on Nuclear Safety

Dr. John Ahearne (Chairman)	Resources for the Future Washington, DC
Dr. Richard Denning	Battelle Memorial Institute Columbus, OH
Prof. William E. Kastenberg	University of California Los Angeles, CA
Prof. Harold Lewis	University of California Santa Barbara, CA
Prof. James E. Martin	University of Michigan School of Public Health Ann Arbor, MI
Prof. Mihran Jacob Ohanian	University of Florida Gainsville, FL
Dr. Dana A. Powers	Sandia National Laboratories Albuquerque, NM
Mr. Paul D. Rice	Georgia Power Company Waynesboro, GA
Dr. Elmer G. Schwartz	University of South Carolina Columbia, SC
Dr. Robert Seale	University of Arizona Tucson, AZ
Dr. Gerald Tape	Associated Universities, Inc. Washington, DC
Ms. Victoria Tschinkel	Landers and Parsons Tallahassee, FL

site include completion of safety upgrades initiated before the decision to shut down N-reactor and completion of a probabilistic safety assessment of the reactor. The attention of the Advisory Committee has been focused on the Savannah River reactors as the nation's sole source of new nuclear materials for weapons.

There have been as many as five production reactors at the Savannah River site. The R-reactor has long been shut down. The C-reactor has recently been retired because of stress corrosion cracking in the reactor vessel. The P, K and L reactors are still operational.

There are safety issues at the Savannah River site. Some of the more important issues that are being followed by the Advisory Committee are:

- Analyses to date are unable to demonstrate that the emergency core cooling systems would maintain cooling of the reactor cores in the event of a large pipe break accident at full power.
- The reactors are aging, and deterioration such as the stress-corrosion cracking of the C-reactor could have safety implications and certainly foretell the end to the useful lives of these reactors.
- Safety analyses at the reactors are not up to the standards developed within the commercial nuclear power community.
- The inadequacy of seismic constraints identified at P-reactor not only indicates that similar problems exist at the other reactors, but raises questions about configuration control at these plants.
- The Department of Energy in the past has not provided the in-depth safety oversight of the Savannah River reactors consistent with its obligation to assure public safety and the standards established by the U. S. Nuclear Regulatory Commission in its oversight of commercial nuclear reactors. The independent internal safety organization, Environmental, Safety and Health (EH), has a number of important initiatives that should improve the DOE oversight role, for example -- on-site presence by DOE staff at the plant has increased substantially.
- During 1989 the operating contractor will change, resulting in possible changes in operating practices and procedures.

The Department of Energy and the operating contractor for the Savannah River reactors are aware of these safety issues and efforts are underway to correct deficiencies. The reactors are limited in the power they can generate to levels that assure the core can be kept cool under pipe-break accident conditions. Modifications are being made to the emergency core cooling system (ECS) and analyses are being done in the hopes of demonstrating the ECS would be effective at maximum power. We will follow these activities closely. Pending the results of these analyses, we cannot advise as to any power level being demonstrably safe.

The Advisory Committee is closely scrutinizing these efforts to improve upon the safety at the Savannah River reactors. A major element of work by the Advisory Committee has been review of the DOE efforts to upgrade its approach toward reactor safety and the safety oversight it provides. Subcommittees have been established to closely review the efforts to improve the emergency core cooling systems, the efforts to conduct up-to-date safety analyses, and the quality assurance practices at the site.

The Advisory Committee recently investigated widely reported incidents during the restart of P-reactor. The investigation showed that the incidents themselves were not significant. At no time was the P-reactor out of control and at no time was there a threat to the safety of the reactor facility or the public. The investigations did lead the Advisory Committee to conclude that there are still weaknesses in the Department of Energy's approach to safety at the Savannah River reactors. The Advisory Committee recommends:

1. Despite the excellent industrial safety awareness program of the current operating contractor, a degree of complacency has apparently developed in the operation of the reactor. The willingness to proceed to power in the face of a large discrepancy in estimated reactivity during the recent start-up of P-reactor did not show an appropriate degree of nuclear safety awareness. In follow-up interviews performed by an EH review committee, the same lack of nuclear safety awareness was noted.

2. Operational readiness reviews for the Savannah River reactors are not sufficiently thorough. A well-developed, comprehensive procedure for operational readiness reviews needs to be established to avoid oversights such as that which led directly to the incidents during the P-reactor startup.

3. Communications between the operating contractor and the Savannah River Operations Office of the DOE are still not adequate. Deficiencies in these communications contributed to the inadequacies of the operational readiness review for the P-reactor restart. The deficiencies also contributed to public uncertainty in the safety of the P-reactor following the restart incidents.

The Department recently developed a Restart Strategy document, which the Advisory Committee has reviewed. Enclosed is a copy of our report on that document to Secretary Herrington. We complimented DOE for turning its attention to the problems at Savannah River and provided advice on the adequacy of its operations. Substantial resources must be applied and many months of hard work successfully completed before restart. We continue to have significant concerns on how DOE organizations have implemented their approach so far.

Further recommendations to the Secretary of Energy concerning the safety of the Savannah River production reactors will be made as findings of the Advisory Committee's subcommittees become available.

I and other members of the Advisory Committee are available to answer any questions you may have on this response.

Yours very truly,

J F Ahearne

John F. Ahearne, Chairman

Enclosure

cc: Honorable Les Aspin
Honorable John S. Herrington

Advisory Committee on Nuclear Facility Safety
to the
United States Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

December 14, 1988

Honorable John S. Herrington
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Dear Mr. Secretary:

Your Advisory Committee on Nuclear Facility Safety has been reviewing the Department's plans for restarting the Savannah River (SR) reactors. A subcommittee spent several days at SR and at DOE headquarters discussing the problems to be resolved prior to restart. We also obtained the services of three consultants. The full Committee[1] has discussed reports from the subcommittee and the consultants and several versions of the DOE's plan for restart.

As requested by Assistant Secretary Baynard on December 5, 1988, we have reviewed the November 1988 document, "Savannah River Plant K Reactor Restart Strategy". We recognize this document represents a consolidation of the views of EH, DP, SRO, Dupont-SR, and Westinghouse. We appreciate the difficulty of developing in a few months a plan to address problems which have been developing over decades. In our opinion, however, the Restart Strategy document represents only an initial step in DOE's efforts to develop sound operations at SRP.

We have broad concerns regarding safety philosophy, the overall criteria for restart, and management. In addition, as described in this letter, the Committee has several specific concerns about the present plans for a restart. These cover the three areas Mr. Baynard asked us to examine:

(1) the technical sufficiency of the criteria,

(2) the degree to which the criteria address the underlying problems which led to the August events at the P reactor, and

(3) the adequacy of the strategy to deal with long and short term safety needs.

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[1] Due to other commitments, Mr. Paul Rice did not participate in developing this report.

Our review represents the Committee's position on information available through the end of November 1988. We recognize that we are commenting on a snapshot of the Department's efforts; we will comment on further developments in the future. We also recognize that some of these concerns may be resolved in the implementation plan, which we understand is forthcoming. Such a plan, which should include schedules, is critical for a successful restart strategy.

Because of the types of issues involved, many of our comments are unavoidably quite technical. We concluded that such technical detail was necessary in order to be precise and to insure accuracy and specificity. Finally, in the following it should be noted that we have also addressed several questions raised by members of Congress in letters about Savannah River.

Safety Philosophy

The Department is currently developing a nuclear safety policy which includes three principles:

1) Management and Accountability
2) Performance Criteria
3) Safety Monitoring

The safety performance criteria are based on principles of safety developed by the International Atomic Energy Agency (IAEA). As adopted by DOE, the criteria are intended to implement the defense-in-depth principle for safety, a time-honored principle used in the commercial sector. The defense-in-depth principle centers on several levels of protection, including successive barriers preventing the release of radioactivity to the environment, protection of these barriers, accident prevention (conservatively designed equipment and good operational practice), and accident mitigation (accident management, engineered safety features, off-site countermeasures). All components of defense-in-depth must be available at all times when a plant is at power.

The Restart Strategy and criteria have not been formulated with this principle in mind, and, in some instances, the defense-in-depth safety philosophy may be compromised, e.g., focusing on accident prevention without a comparable examination of measures for accident mitigation in terms of seismic resistance. Similarly, training focused entirely on "how to" with little attention to "why" is counter to active accident management which prepares the facility, its procedures and its personnel to deal with the unexpected and the unknown so as to assure the health and safety of the public, as well as the on-site personnel. The Department should begin to implement its nuclear safety policy by measuring the current restart strategy and criteria against the policy statement for completeness, timeliness, and adequacy. At a minimum this can be qualitative, and with time a more quantitative approach can be employed.

The Restart Strategy reflects a recognition that safety standards of the plant have not kept pace with changes that have occurred in the nuclear industry and that these plant safety standards must now be considered unacceptable. The word "unacceptable" is key. The Restart Strategy authors must have intended the list of requirements to be the minimum set of actions needed to bring the plants to an acceptable safety level, even though that level has not been defined. The Department is struggling with how to determine and how to express the criteria for an acceptable safety level.

We suggest that "comparable to commercial standards" is a reasonable objective, but difficult to implement quantitatively. This does not mean one should try to duplicate the thousands of pages of "case law" and guides that make up the commercial standards, but only that the effects of these can serve as a level to seek. The Nuclear Regulatory Commission has promulgated a set of safety goals, but it is not even known if the commercial reactors, which are much more thoroughly analyzed, meet those standards. What is known has become known through detailed, carefully reviewed probabilistic analyses, which are beset by large uncertainty. Such probabilistic analyses have only recently been undertaken for the Savannah River reactors and are not available to guide the establishment of a "comparable to commercial standards" policy.

We believe effective implementation of a nuclear safety policy must be largely subjective, involving the corporate judgments of responsible people knowledgeable about both worlds. That is, in effect, what the Department is attempting through the infusion of people with broad commercial experience into the previously insulated DOE complex. In the end, the judgments of such people about the DOE reactors must prevail if any policy is to be effected.

That, however, leaves open questions of quantitative criteria, such as seismic criteria. To the extent that some conditions of acceptable performance can be quantified (e.g. number of operators in a control room, seismic margin, etc.) they should be, although uncertainties in the estimates should be recognized, and even these are matters of judgment. (Witness the current dispute over whether commercial operators should have degrees.)

We believe that although neither commercial standards of safety nor an acceptable level for DOE reactors can be defined quantitatively, at present, responsible and credible comparisons can be made by people familiar with both, and this is probably the most effective criterion one can use for restart.

Criteria for Restart

Over the past several years many safety related issues associated with the Savannah River reactors have been described in internal DOE and external, independent appraisals. These problems have been recognized and are being addressed. Many programs have been initiated and others are planned in order to achieve the necessary improvements. Collectively they are described under a single program called the Reactor Safety Improvement Program (RSIP), the completion of which will require several years.

The immediate problem is the restart of one reactor, for which the Restart Strategy document has been developed. It is not clear, however, that all of the requirements in this document must be met prior to restart. In the Restart Strategy document there is an absence of a clear-cut safety philosophy upon which the restart strategy and criteria are based. The document seems to alternate between an absolute standard and a safety upgrade approach, and does not clearly identify which actions are essential for restart and which require attention over a longer term but after restart.

Management

Substantial and, to a large extent, justified criticism has focused on weaknesses in management control, training, operator practices, and reporting procedures at SRP. Many elements of the Restart Strategy address these problems. However, the problems do not all fall within the contractor's organization and responsibilities nor with DOE's Savannah River Operations Office. DOE headquarter's operational and regulatory responsibilities require attention so that the field can more effectively achieve an acceptable start-up condition. The Department should maintain the distinction between management and oversight. As stated in the draft DOE Safety Policy, "clear, unambiguous lines of authority" should be established. This includes DOE as well as the contractor. We do not find that to be the present situation, where instructions are being given to the contractor and the SRO by several DOE headquarters organizations. Management directions should be transmitted along a single, clearly identified line. Oversight can be done by several organizations, whose role is to determine present status or to examine past performance. However, their recommendations should be transmitted through an explicit management line.

SPECIFIC CONCERNS

Operating Power Level

Establishing the power level for acceptable operation will be a major task, requiring substantially more effort than had been recognized by DOE when the problem was first identified by the National Academy in 1987. It is essential to establish a technically defensible power level for reactor operation. This power level must permit assured cooling of the reactor after a design basis loss-of-coolant accident.

There are two important time periods in a design basis accident in which reactor cooling could be inadequate. During the first few seconds of the accident, the flow through the core drops rapidly but the power remains high until reactor scram has been effected. Significant boiling in flow channels during this phase of the accident could result in flow instability, voiding of flow channels and subsequent rapid heating of the fuel.

The second key phase of the accident occurs after substantial loss of reactor coolant from the break. In this phase, cooling of the core depends on flow from the emergency core cooling system (ECS). The potential entrainment of air into the cooling water as it enters the channel complicates the analysis of the thermal hydraulics. Again it is essential to prevent boiling in the flow channel, since the buoyant vapor would tend to limit the flow of the emergency coolant downward into the assembly. Operating power limits must be established which assure adequate cooling in both phases. The analytical methods that are used to determine these limits should be supported by prototypic experiments. Such "separate effects" experiments which have been completed are of questionable value for determining power limits.

As a consequence, at this time an analytic determination of power limits cannot be derived with any confidence. At present, such power limit calculations must include a number of appropriately conservative safety margins which have not been satisfactorily defined. The power limit which would result from this procedure will likely be a small fraction of the nominal power rating. Unfortunately, the current experimental research program cannot be expected to yield an improved methodology in the near term.

Control Room and Operating Philosophy

A fundamental good practice in the operation of a reactor is to provide the operators with the data needed to allow them to make the decisions necessary to assure that the desired evolutions of the reactor are in compliance with the Technical Specifications. Another fundamental good practice is to keep the operators' work environment free from distraction and unrelated discussions. We are concerned that both practices may be violated by the Restart Strategy. At Savannah River, an excessive number of representatives of contractor, oversight, DOE/SRO, and DOE Headquarters organizations argue for the right of control room access and physical presence during reactor operations in general, and specifically during startup following a shutdown. These arguments are based on claims of responsibility for plant operational safety and, consequently, for status in the control hierarchy. Because of such claims, the population in the control room during restart is proposed to include a minimum of 12 people:

5 - Operators (the minimum)
1 - Technical Support Engineer
1 - Shift Advisor
1 - DOE/SRO On-site Engineer
    (5 present for re-Start)
1 - ESH/SRO Inspector
1 - EH/DOE Hq. Observer
1 - DuPont Oversight Representative (RSED)
1 - Contractor Operations Manager

12 - Total (minimum)

This number is clearly excessive. Indeed, it is difficult to see how such a large group could communicate effectively to provide prompt attention to any crisis situation. The list of people required for plant control room duties should be reviewed carefully and access limited to essential personnel.

The Staffing Plan for Reactor Operations includes assignments for three different Senior Level people in the Control Room. These include the Certified Senior Reactor Supervisor, the Technical Support Engineer, and the Shift Advisor. The detailed duties of these individuals during startup, normal operation, and in emergency situations will of necessity be altered in crisis situations. The supervisory relationship between these three Senior Level people should be clearly delineated to assure there is an unambiguous chain of authority.

The staffing plan for the Savannah River reactors assigns at least one degreed Certified Reactor Supervisor to each shift crew to provide analytical/technical expertise as a resource to operating personnel. The interim position of Technical Support Engineer (TSE) has also been identified as a part of each shift to provide knowledge of the safety envelope and bases until training of operation personnel has been satisfactorily implemented, implying an unacceptable level of technical expertise and familiarity with the plant by the degreed Certified Reactor Supervisor.

A key tenet of the safe operation of nuclear plants is that plants have to be operated within a well-defined envelope of safe operation. This envelope of safe operation follows directly from the Technical Specifications for the plant. Operators are required to do more than simply follow well-defined procedures. They are also obligated to assure plant operations do not violate the boundaries defined by the Technical Specifications. This is an obligation that cannot be delegated. Unfortunately, the Reactor Restart Strategy does not conform to this tenet. Operators are required simply to follow procedures. Assurance that these procedures do not place the plant outside the safe operating envelope is not to be the responsibility of operators. It has been relegated, instead, to the Technical Support Engineer. The Committee believes this to be a mistake. The responsibility should reside in the hands of the Senior Reactor Supervisor, in which case, the Technical Support Engineer becomes superfluous. The Committee sees no reason why the Senior Reactor Supervisor cannot be trained to assure Technical Specifications are not violated during reactor operations. Furthermore, the presence of the Technical Support Engineer in the control room can weaken the line responsibility and the authority of the Senior Reactor Supervisor. We recommend that the functions of the proposed Technical Support Engineer should be assigned to the duties and responsibilities of the degreed Certified Reactor Supervisor.

Reactivity Control System

A reliable reactivity control system is essential for the safe operation of any reactor. The control systems at the Savannah River reactors have exhibited a number of deficiencies over the last several years. Incidents during the P-reactor restart in August demonstrated some of these deficiencies and recent operations have shown control rods can mechanically lock together. DuPont maintenance strategy is to inspect about one-third of the control rod drive mechanisms. Current restart plans require only assuring control rods and their drive mechanisms are latched. The Committee believes a thorough verification of the status of the entire control rod system is essential prior to restart. The verification should include inspection and maintenance of all of the motor packs, synchro-transformers, and T-amplifiers, as well as examination to assure adequacy of the latching mechanisms.

Seismic

The Committee has had difficulty getting a clear description of the status of the seismic program, primarily due to the major review being done by the DOE. The following are our initial comments. We will provide additional comments after further review.

The Seismic Resistance Issue in the Restart Strategy appears to be narrowly focused, does not indicate what must be completed before restart and tends to weaken the defense-in-depth philosophy. The Seismic Resistance criterion requires the capability to shutdown, cool and monitor core status for a design basis earthquake (0.2 g), but it is not stated whether or not this needs to be completed before start-up. No attention is given to the engineered safety features (ESFs) with respect to seismic criteria. Seismic criteria for the confinement system and the ECS system were not included because neither is considered to be a "primary safety system". Crucial instruments are to be seismically qualified, but the instrumentation system (wiring, sensors, etc.) is neglected.

Although the seismic criteria are stated in terms of a discrete number (so many g's of acceleration), a spectrum of seismic events and a spectrum of seismic response exists for each system. Second line (e.g. (ESF) systems provide the defense-in-depth in the so called "tails" section of these spectra. Consequently, the DOE should include the second line (ESF's) in the seismic criteria for restart. To insure the defense in depth philosophy, a broad approach should be taken. We recommend that the ECS and confinement systems be seismically upgraded prior to restart. On an interim basis, consideration should be given to different levels of seismic criteria for different systems, consistent with the overall safety philosophy. For example, a specific objective of returning these ESF's to their original design base of 0.1 g should be considered prior to restart, with a longer term goal of 0.2 g consistent with the new seismic design basis. Using the proposed Safety Objective Policy as a guide, a rationale should be developed for deciding which upgrades are of immediate concern, which can be delayed until after restart and for how long. It is important to make explicit the reasons for requiring that a specific set of criteria are to be met, and for allowing others not to be met until later.

Ultrasonic Testing

The reactor coolant systems of the SR reactors, including the reactor vessels, are susceptible to stress corrosion cracking. Indeed, stress corrosion cracking has been observed in the piping systems of the reactors and was responsible for the retirement of the C reactor. Frequent inspection of the reactor vessels and the reactor piping system is an essential component of the strategy developed by DuPont to deal with the hazard of cracking. DuPont has developed a state-of-the-art ultrasonic crack detection capability to augment visual inspections of the vessels for stress corrosion cracking. However, the Restart Strategy does not require the use of the ultrasonic inspection capability prior to restart of the K reactor. This omission of thorough ultrasonic and visual inspections of the piping and vessels for cracks should be explained and justified. The need for such inspections has recently been made more obvious by evidence that inspections in the past may not have included all critical regions of the reactor coolant system susceptible to stress corrosion cracking.

Configuration Verification

Configuration management is an important element of reactor safety. System drawings must be representative of the existing plant and the plant design must be supported by safety analyses. In the seismic walkdowns performed for the P reactor, a number of discrepancies were observed between drawings and the actual condition of the plant. Conversely, the L reactor walkdowns did not identify many discrepancies. Thus, it is clear that substantial differences in configuration control exist between plants.

We suspect that major differences could also exist among different systems within a plant. Over the lifetime of these plants many changes have occurred at different time periods. The ECS system, for example, has experienced a number of backfits. The degree of configuration management exercised at these different periods may have varied. The Committee does not accept the assumption that a small sample of key safety systems can be considered representative of the safety systems in the plant as a whole for the verification of the plant condition. The Committee has no confidence that the Restart Strategy plan to sample five systems would identify a problem, if it exists. Furthermore, in our discussions with DOE and contractor staff, it was not clear how the sample results would be used quantitatively. For example, would one discrepancy be enough to indicate a problem which required fallback to a different strategy? The Committee believes that confirmation and documentation of the existing configuration of the plant are basic to safe operation. We see no acceptable alternative to a complete walkdown of the plant.

Quality Assurance

Consistent with basic safety principles for nuclear power plants, quality assurance (QA) is applied throughout activities at a nuclear power plant as part of a comprehensive system to ensure with high confidence that items delivered or services and tasks performed meet specified requirements. The Committee is concerned that DOE and its contractor have not yet established a comprehensive and integrated QA plan that would encompass the management controls and verification actions needed to ensure safety of equipment and processes associated with reactor restart. Quality assurance elements are fragmented throughout the management systems and practices listed in the Restart

Strategy document, with significant deficiencies in the identified QA elements and in the organizational structure needed for their effective implementation.

The Committee believes that a comprehensive and integrated SRO and Westinghouse QA plan should be developed and in place prior to reactor restart. The Committee recommends that DOE request Westinghouse to review and evaluate the QA plan, to perform a baseline assessment of the state of quality of the plant and its extent of verification, and to determine needs for continuing improvements. Technically-oriented self assessments should be an integral part of the verification process. To accomplish these objectives, the Committee recommends that DOE and Westinghouse ensure that the proper organizational framework is operating, with well-defined lines of responsibility, authorities, and communication for achievement and verification of quality.

CONCLUDING COMMENTS

Finally, the Committee has two general observations which go beyond the restart strategy document. We have been involved in review of SRP since June, and we expressed our initial concerns in our letter to you of August 15, 1988. Subsequently we reviewed the August events and since then have followed with interest and concern the many critical reviews. We conclude that the effort required to meet the Restart Strategy precludes an early restart, and we endorse your recent statement that the plant will not operate until at least next spring or summer. Substantial resources will be required to implement DOE's plans, and hard as it may be to obtain additional funds, competent people are in even shorter supply. Therefore, we recommend that the Department focus all available resources on restarting the first reactor, with subsequent action on the other two. We also recommend the earliest possible involvement of Westinghouse personnel, since they will be the responsible contractor when the reactor(s) restart.

We have not addressed training in detail in our response. Other actions must be implemented before training can incorporate improved practices and clear operating conditions. Changing attitudes will take time, and changing attitudes are critical to a sound restart program. The Committee will continue to follow the restart program and will provide our comments on the training program once the details have been developed and provided to us.

We also have not addressed radiation protection, although Committee members, staff and consultants have identified radiation protection weaknesses at SRP, particularly in contamination control. Many times over the years of SRP operation, radiological contamination has occurred and not been detected promptly, leading us to a preliminary conclusion that

Savannah River needs improvement to meet the standards of good industry practice. The Committee will examine this issue further and provide you with our comments.

We are unable to advise whether the Restart Strategy will meet "the long and short term safety objectives", as required by Assistant Secretary Baynard. Put another way, at this time we are unable to advise whether the SR plants will meet the overall safety criteria of adequate protection to the public and the workers. As the program becomes clearer, the implementation schedule defined and progress made toward meeting the acceptance criteria, we will provide our advice on this major question. The Restart Strategy document is only an initial step.

We hope this report will be of use to you and your staff in implementing the actions necessary at the Savannah River plant for the return of the reactor(s) to service.

Sincerely,

John F. Ahearne

John F. Ahearne, Chairman

Senator EXON. I am also entering into the record a memo prepared by Mr. Starostecki, responding to these comments.

[The information follows:]

United States Government **Department of Energy**

memorandum

DATE: January 9, 1989

REPLY TO ATTN OF: EH-30

SUBJECT: ACNFS Comments on Savannah River Reactor Restart

TO: Ernest C. Baynard III
Assistant Secretary, EH-1

On December 14, the recently formed Advisory Committee on Nuclear Facility Safety (ACNFS) issued several letters to the Secretary and to the Chairman and minority leaders of several congressional committees. The subjects included the views of the ACNFS on the situation at Savannah River and criteria for restart of one or more of the reactors.

The Department has an obligation to carefully consider the views of the ACNFS and to give the Committee some early feedback on its recommendations. This memorandum contains such feedback, and I recommend that it be provided to the Advisory Committee as soon as possible. The ACNFS did not have the benefit of the interactions and discussions that produced the K Reactor restart strategy. In fact, only an ACNFS subcommittee had discussions with the contractors and Savannah River Operations personnel. With that in mind, I want to share my reactions to recent ACNFS recommendations and provide my recommendations on where we ought to go from here.

There are valuable insights contained in the comments of the ACNFS which itself demonstrates that the process is working. However, the nature of the comments demonstrates the need for better interaction with the ACNFS. My concern is twofold: First, the Committee seems to be making numerous recommendations that focus on technical and hardware fixes and on compliance with selected technical requirements for systems and components. Such an approach was tried in the commercial sector after TMI-2. With hindsight, it was only marginally successful in improving safety. Refocusing industry efforts in the mid 1980s on management improvements and rising standards in excellence in operations have been much more productive. Second, the Committee appears to be embracing standards of excellence in design that are not appropriate for older facilities and should not be imposed on decisions surrounding Savannah River reactor restart.

We need to discuss with the Committee why some of its comments should be reassessed and why some of their views may not be appropriate when applied to a restart decision for the Savannah River reactors. We have additional information to bring to the Committee's attention. That information will help the Committee to understand why EH is satisfied that the readiness for plant restart should not be judged by whether or not optimum upgrades have been made. Rather, we are satisfied that a long term, integrated, evaluation and upgrade program for SRP (Reactor

Safety Improvement Program-RSIP) will define a phased program of safety improvements over the next several years to assure long term safe operation of these facilities. The results of EH reviews and inspections to-date lead me to conclude that there are no fundamental technical issues that preclude restart of one SRP production reactor within the next 6 to 9 months. A better focused and more integrated management approach is needed to deal with the problems identified to-date and others that will surface as a result of ongoing assessments by EH and others.

The development of the restart criteria was an attempt to identify a complete set of actions which, if fully implemented, would permit restart of the K reactor, without resolution of the underlying management problems. The accelerated infusion of new contractor personnel at SRP and their recent performance indicates that this approach may not be necessary or appropriate. The ability of new contractor personnel to develop an effective RSIP program will be a better demonstration of contractor management competence and could be the primary, and more appropriate, benchmark for a restart decision.

I have attached two statements for your use in considering my recommendation for an early meeting with the ACNFS. One is an attempt to more clearly expand on the thrust of my recommendations for action, as set forth on September 16, 1988. These should, in my view, provide the foundation for dialogue with the ACNFS on the matters of safety approach and criteria. The second attachment addresses some specific recommendations regarding the principal ACNFS comments in its recent letters.

Finally, there are three observations that should be foremost in setting a course in the near term:

(1) Competent and experienced management is essential in assuring safe reactor operations. I have been disappointed that it has been taking months to do at SRP what the commercial sector has shown can be done in weeks. The safety culture at SRP is undergoing change with the infusion of new management. As in any organization, the workers at SRP take their cues from what they perceive their top management thinks is important. Focusing resources to develop a strong management team is the key to future success at SRP.

(2) The Department should concentrate on the safe restart of one reactor. Dealing with three reactors on a concurrent schedule dilutes our efforts. I am confident the new management at SRP will quickly apply the lessons learned at K-Reactor to the other reactors. Subsequent startups of the other reactors will be able to reap the important benefits in safety that come from proceeding expeditiously with a phased restart program.

(3) We should not fall in the trap of asking ACNFS to make judgments as to whether a given activity can be done with "adequate protection to the public and the workers". It is a DOE line management responsibility to render such judgments.

Richard W. Starostecki
Deputy Assistant Secretary
Safety, Health and Quality Assurance

Attachments

cc: EH-30 Office Directors

ATTACHMENT 1

DOE EMPHASIS ON IMPROVED MANAGEMENT CAPABILITIES

1. Competent and experienced management is essential to any activity involving hazardous materials.

It is important to focus on management's preeminent role in providing safety, because assurance of safety performance cannot be achieved by sole reliance on technical solutions to specific safety problems. That is, attention to management provides a wider range of protection against possible unsafe conditions than does the narrow attention to already identified technical issues. For example, the broader protections afforded by attention to management include assurance that (1) predictable problems are avoided, (2) unavoidable problems are quickly identified and dealt with, and (3) root causes of problems are identified and addressed to avoid their recurrence.

Competent managers provide the environment, we have come to call it a safety culture, in which hazardous activities can be accomplished safely, with adequate protection of workers and the public. In the DOE there are several good examples where DOE contractors have demonstrated a capability to respond to problems, take effective countermeasures and undertake initiatives to foster critical self-assessment. EG&G has undertaken on their own initiative, with the support of the DOE Idaho Operations Office, a site by site review of activities which represent the best practices within the Department. Such a review mirrors the initiatives of INPO within the commercial sector. Performance of the Advanced Test Reactor and the Chemical Processing Plant in Idaho has shown that contractors can effectively work their way out of management problems. Even the recent experience at the Rocky Flats plant is encouraging. There has been a marked change in the approach to safety management by the Rockwell contractor and the DOE Albuquerque Office within the past year. Similar progress is being made by Martin Marrietta and DOE Oak Ridge with the HFIR reactor, although it has taken somewhat longer. These experiences serve as models of what can and should be done in facilities that have old equipment that do not meet all new safety standards.

1(b)

Even if management attention to safe operations is not firmly embedded in all practices at a site, for a time reliance can be placed on the safety margin that should have been designed and built into the facilities involved in the activity. Generally, such short term reliance is possible with most nuclear facilities because they contain a considerable measure of conservatism in their design, conservatism that has come to be called a factor of safety or defense in depth.

However, the protection afforded by factors of safety and defense in depth can not be confidently relied upon for long periods of time if management decisions display a consistent pattern of "cutting corners on safety." Eventually, facilities wear out, people lose their safety consciousness, and safety erodes.

II. DOE should concentrate its efforts on the highest priority issue, namely, assuring that improvements are made in areas of identified management weakness.

It is relatively easy to look at old facilities, nuclear or otherwise, and point out departures from current safety standards. Experts can do this with commercial nuclear facilities as easily as they can with government nuclear facilities. In some cases the differences are important, and in other cases they are not.

Shortcomings at SRP include ECCS power limits, pipe cracking, configuration control, seismic design, fire protection, and others. The solutions to these problems can and are being debated. But these are relatively straight forward technical issues, and there is little doubt that they can be resolved in a relatively short order, at least to the degree necessary to justify restarting the Savannah River Reactors.

However, there is a danger with EH or the ACNFS becoming preoccupied with debating these technical issues and loosing sight of the main issue that led to shutdown. The long term safety improvements and the long term safety assurances that are needed for DOE's nuclear facilities, particularly the production reactors, are dependent on having in place a management team that can devise and implement effective programs. There simply are not enough safety overseers in EH and ACNFS combined to allow them to become the people primarily responsible for designing solutions to the known technical deficiencies. The focus for the safety oversight must be on management performance by the contractors to achieve a multiplication of our efforts.

1(c)

An example from the commercial sector may help to make the point. In the early days of the nuclear power program, AEC and NRC safety engineers emphasized technical issues, hardware performance, and compliance with specific facility standards. That approach did not serve to prevent the accidents at Browns Ferry or Three Mile Island.

It is important to bear in mind that it was not the technical issues that shut the reactors down in the first place. It was the inability of the contractor to deal with the P-reactor startup anomalies in a manner that instilled confidence that the contractor's personnel could and would prevent any incident from progressing into an accident.

III. The resolution of technical issues is important, but is not a substitute for management involvement.

The development of restart criteria was an attempt to identify a complete set of actions which would allow restart of a reactor even if the underlying management problems were not yet resolved. No single item in the set of restart criteria was magical. One of the reasons I have been frustrated regarding the situation at Savannah River is the longstanding inability to move quickly and resolutely to resolve technical issues. It has been discouraging, upon reflection, to observe the nature and number of issues that have been identified in the past by oversight organizations (e.g., NAS) and for which we are still awaiting resolution. Therefore, the solution at Savannah River should deal with both safe restart and continued safe operation. What is essential is that:

- there is effective consolidation of lines of authority by the new contractor;
- good managers having experience with successful operations of older nuclear facilities are brought into the organization;
- an integrated long range Reactor Safety Improvement Program is developed and funded to assure safe operations until new production capacity can be built and placed into operation; and
- there is demonstrable change in management attitude supporting an open and positive safety culture.

Recent events at Savannah River indicate to me that the new contractor and DOE:SRO are taking the rights steps.

ATTACHMENT 2

EH-30 REVIEW OF ACNFS RECOMMENDATIONS OF 12/14/88

ACNFS CONCLUDING COMMENTS

Focus on restart of one reactor: Agree. The confusion that has resulted from collateral activities at P, K, and L Reactors has made it hard to concentrate management resources and has been wasteful of people and dollars. It is prudent to learn on one reactor, and then turn to the other reactors, having reestablished an operational safety attitude and climate at Savannah River.

Earliest possible involvement of Westinghouse: Agree. Westinghouse has already taken important steps to assure that it begins operations under the best possible circumstances, and DuPont appears to be cooperating fully in the transition. What needs to be considered are more efforts along the lines of the plant walk downs identified in the restart criteria; these seem to be effective ways to bring parties (DP, SR, EH, and contractors) together and to help Westinghouse prepare to assume full operating responsibility.

ACNFS COMMENTS ON SAFETY PHILOSOPHY

All components must be available at all times when a plant is at power:

Agree with qualification. This is a safety principle of the IAEA, and it has been applied in the US for many years. However, in commercial plants, allowances are made for equipment temporarily out of service, the possibility of temporary or controlled lapses in coverage of protection by one barrier or more, and even the failure of one or more barriers for certain design basis events. Citation of this principle by the ACNFS as a basis for seismic qualification of the ECS and confinement before restart is an erroneous application, and these are not justifiable safety enhancements.

Comparable to commercial standards is a reasonable objective: Disagree. Although the DOE orders contain some general comments regarding comparability, in the context of the K-Reactor restart, the use of such a test is inappropriate. K-Reactor, like the others at SRP, has never been tested thoroughly against commercial standards; when it is so tested, it will not measure up; and it can

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2(b)

never reasonably be brought into full compliance with commercial standards. Furthermore, the NRC applies its own requirements for the commercial plants in different ways depending upon the age of the plant. For older plants there is extensive reliance on engineering judgment. The same principle should apply to the K-Reactor.

ACNFS' SPECIFIC CONCERNS

Operating Power Level: "The power level must assure cooling of the core after a design basis loss of coolant accident..."

The thrust of the comment in this area is a call for prototypic testing to support the power limits. This is acceptable, and we agree that a "technically defensible" power level needs to be chosen, but the level will necessarily involve some engineering judgment. The amount of judgment will of course be inversely proportional to the power level. As in the case of power reactors, it is likely that an appropriately conservative power level can be chosen, using expert judgment, on the basis of information available within the current time frame, subject to future verification by more prototypical testing.

Control Room and Operating Philosophy: The ACNFS has raised some legitimate concerns in this area, which can and should be resolved in the development of a startup testing program. There are stated conerns about the operating envelope and its interface with operator responsibilities; the statements raise a concern as to the specificity of the recommendations and the role of management in structuring a revitalized operating structure.

Reactivity Control Systems: The additional inspection and maintenance suggested by the ACNFS, including complete walk throughs, is not appropriate.

Seismic: The recommendation that ECS and confinement be seismically upgraded prior to restart is unjustified; this approach has no obvious basis or foundation and distracts management from other safety issues.

ISI: The ACNFS recommends that the contractor explain the rationale for restart in the absence of a full ISI. That is the intent of restart criterion DB 6.5, and we agree that it should apply to the entire process system. This is not to imply that the decision on whether to require a full ISI before restart has been made at this time.

2(c)

Configuration Verification: The ACNFS recommends a complete walk down of the K-Reactor. We agree that walk downs are very important for assuring safety of this facility. The restart criteria require a large number of walk downs for seismic qualifications, technical baseline verification, fire protection status, and material condition. See criteria DB-6, 4, and 2. The sample for the technical baseline verification was carefully designed, based on a systematic evaluation of postulated accidents. If this program shows that more walk downs and verifications are required to give confidence in the state of configuration control, that will be done before restart. To decide that issue now without sufficient information would not be justified and would be counter to practice in the commercial industry.

Quality Assurance: We agree with the thrust of the ACNFS comments in this area. However, the ACNFS comments appear to stress the administrative aspects of a QA plan; quality cannot be realized by emphasizing QA audits or inspections. What is needed in the short term is demonstrated management performance.

Senator EXON. Finally, we are extremely pleased to have with us Mr. James Moore, the president of Westinghouse Savannah River. Westinghouse will take over the operating contract at Savannah River starting April 1 next.

The Nation recognizes that you have undertaken a significant and difficult task, one that is critical, absolutely critical to our national security interests.

We encourage you to make Westinghouse Savannah River a center of excellence among our Nation's nuclear facilities.

Thank you for joining us today.

I will be yielding to my friend and colleague, Senator Strom Thurmond, the ranking minority member of this committee when he arrives.

At this time, I am very pleased, in our usual order of early bird arrival, to have comments from the two Senators who are with us now.

I believe the early bird rule would require that I recognize Senator John Glenn of Ohio. I want to commend Senator Glenn for the leadership role that he has taken in this area, not only as a member of this committee, but also as chairman of another very important committee that he chairs in the U.S. Senate.

John do you have any opening remarks?

Senator GLENN. Thank you. I have just a few short remarks.

I would first like to associate myself completely with your opening statement. I think it is a good precis of where we stand, Mr. Chairman. I would add just a few remarks to it.

This is the committee and the subcommittee that has the authorization jurisdiction, and, as such, it will be the main committee that will be dealing with that on the budget. We have added to some of this committee's work with the investigative responsibilities that we have on the Governmental Affairs Committee. But our work is in cooperation with this committee, and we have kept this committee fully informed.

You gentlemen at the table are all aware of our efforts because you have appeared before the Governmental Affairs Committee.

Mr. Chairman, I want to commend you for holding these hearings. It is time we get going on this. The problems that we have had in this business, are things that have built up over a very lengthy period of time, some 38 or 39 years. Now we have to address these problems and, in effect, pay the piper for some of the past sins of omission or commission.

We have to address these things. National defense is among our most serious needs. We have to maintain our nuclear deterrent in a way that does not threaten the health, safety, and environment of our own people.

I continue to be a very strong supporter of our U.S. nuclear defense capability. Our inquiry into these areas has not been geared to try to reduce our nuclear capability in this country at all. It's focus has been to try to enhance it, but, at the same time, make it safe for our own people.

There is no doubt that we must assure that the U.S. Department of Energy's Nuclear Weapons Complex is upgraded and modernized.

So I stand fully in support of the chairman's goals and the Armed Services Committee effort to achieve these goals.

We are at a critical stage in this process. In fact, we have reached an historic crossroads this year, Mr. Chairman. The cleanup is probably going to outlive all of us in this room right now, with respect to the time it will take to really do the full range of things that are necessary. That is an effort which we really have not addressed properly in past years. I believe the administration must make large and concerted efforts in this area, because it has been too long ignored.

In making these decisions, we can take careful stock of the public record created not only by this committee but by Governmental Affairs and over 30 GAO [General Accounting Office] reports, many congressional oversight hearings, and numerous scientific reviews and DOE studies.

This body of information has identified several very important problems which must be corrected. We cannot let secrecy, isolation, decentralized management, and self-regulation, all artifacts of the 1950s cold war era, keep us from solving this problem. They have been contributors to the crisis by affecting our DOE program in the past, and we can't let that continue.

The chairman mentioned the monetary costs of dealing with this crisis, and they are staggering. Some of the testimony we have had, Mr. Chairman went far beyond anything that we had foreseen, and even beyond the figures that you mentioned earlier. The last estimate we heard on the Governmental Affairs Committee for modernization and cleanup, addressing the full scope of environmental concerns was $244 billion over a 20 to 30 year period.

We are going to have to average over a 30-year period something like $8 billion or $9 billion a year if we are really going to address this problem in a serious way.

I don't think we can take that out of DOD's hide, that is, to pay for this effort. I just don't see how we can do that.

So, one of our problems is going to be to discuss publicly and privately how we can set up some cleanup fund. We can't just say that the Defense Department is going to have to absorb this cost and reduce its other expenditures by $10 billion. We do have serious DOD requirements, and we can't just take the money out of the DOD budget, as a lot of people seem to think we can.

We have had several good reports on cleanup and modernization, and I'm sure we'll be dealing with those here.

We've had the 2010 Report, which is supposed to define what the complex will look like in the year 2010. Along with that, we have asked in the past for cost estimates of the cleanup. Those estimates have now been made in a separate report, generally referred to as the December Report. It has two volumes. The first defines the whole problem. The second volume tries to spell out what the changes would be at each particular site and what those changes would cost.

We know you are working on estimates to go even beyond that and try to defend those costs even more clearly. But at least we have made a start. That is what I wanted to emphasize.

Mr. Chairman, we all remember the story of the mule. You had to hit it with a two-by-four to get its attention. Well, I think once Secretary Herrington and some of the people at this table were sensitized to the problems in the weapons production complex, they began to do more. I have been very complimentary about the efforts that have gone on over the past couple of years, and in particular with regard to trying to get money into the budget.

We know what happened this year.

Mr. Herrington and our witnesses tried to get a more decent budget—that is, more decent, as we would see it. You ended up in a big battle with OMB. You did not win. It went to the White House for a decision, and the smaller budget figure of $1.4 billion was put in, of which only about $300 million is devoted to cleanup.

Well, that will just about buy the blueprint paper for what has to be done.

So, we have to push in those areas. We need to get a decent budget.

But I am quite happy to give credit where credit is due, on the efforts that have been made over the past couple of years to try to get money for cleanup so that we can get started on it.

Mr. Chairman, I am happy to work with you. We have all the information of this committee and the Governmental Affairs Committee available to us. We want to combine these efforts here. We want to work most cooperatively with you in helping to solve this problem and we appreciate your efforts in this area.

Senator Exon. Thank you, Senator Glenn.

You highlighted one thing that I think needs to be highlighted, and that is where we are going to get this money with a zero growth or zero real growth in the defense budget, which we understand is coming down the pike. There is no way that we can finance this out of any fund like that.

And there is a great hue and cry around the country today, one justifiably so, about the critical situation with regard to the savings and loan industry. Indeed, it is critical.

In my opinion, as important as that is, it pales by comparison with the problems that we have in this area.

Maybe to whatever funding mechanism we finally come up with to finance the S&L cleanup, we can just tack on a small figure, like $4 billion a year, to solve a problem that I think is more important.

Before I call on Senator Bingaman for his statement, for his contribution, I am pleased at this time to call on Senator Thurmond, from South Carolina, who, I suspect, like me, was over at the prayer breakfast this morning. I had to leave even before the President talked or tried to talk. I don't know whether the President could even talk because of his laryngitis or not.

I am pleased to recognize my friend and colleague, Senator Strom Thurmond, of South Carolina. He has been a real pro in working on this problem.

Senator **THURMOND**. Thank you.

Since we have a Republican President, I couldn't afford to leave until he spoke. [Laughter.]

Thank you, Mr. Chairman.

It is with a great deal of personal pleasure, Mr. Chairman, that I acknowledge that we will, once again, be working together on strategic and nuclear matters.

Your leadership on these most critical and sensitive issues is well known, and I look forward to our partnership during the 101st Congress.

You are to be especially congratulated, Mr. Chairman, on your leadership in the critical nuclear materials issue.

This hearing and those that will be held this afternoon and tomorrow morning should be read by all as indications of the urgency and importance that the Armed Services Committee will attach to the materials crisis this year.

You recognize very early, long before the series of events that will be the subject of today's hearings, that the national security depended critically on an assured supply of nuclear material.

You further recognized that the Nation's production capacity was very fragile. None of us could have imagined 2 years ago just how fragile that capacity was to become.

Mr. Chairman, the task facing you and this committee is a most demanding one. I say that because our responsibilities do not end in uncovering the problems with the Nuclear Weapons Production Complex.

This committee, as the authorization committee, with budget responsibility for the defense programs sector of the Department of Energy, must also identify the solutions for these problems, and, equally important, identify the resources with which to implement these solutions. That will be a very difficult task, indeed, in view of the anticipated constraints on the overall defense production budget.

Mr. Chairman, I join you in welcoming our witnesses this morning. Each of them represents an important perspective on the challenge that faces us in restarting the Savannah River reactors.

I note the absence of Mr. Peter Brush, the Acting Assistant Secretary for Environment, Safety, and Health, who was scheduled to be with us and has suffered a mild stroke. We wish him a speedy recovery.

In the next 2 days, Mr. Chairman, our focus will be primarily on the challenge and urgency of meeting our nuclear materials requirement in the near-term, and with assured modern capacity into the next century. There should be no doubt that these requirements can only be satisfied in a manner that protects the safety and health of our citizens and the environment.

I look forward to future hearings that will focus on the challenge of environmental restoration actions.

As you noted, Mr. Chairman, these actions are needed to undo the damage of decades of operation when there was less sensitivity to the environmental consequences of those operations.

Mr. Chairman, I will have a number of questions for our witnesses which I will ask at the appropriate time.

Again, I thank you for your fine leadership.

Senator EXON. Thank you very much, Senator Thurmond. We all appreciate all that you have done in this area.

I want to call on Senator Bingaman, now, from the State of New Mexico.

Certainly Senator Bingaman is second to none on this committee or the Senate as a whole, with regard to our whole nuclear complex, from beginning to end, because of his State and what does or does not happen in his State.

Senator, I want to thank you publicly for your help over the years on this and would invite any opening comments that you have at this time.

Senator BINGAMAN. Thank you, Mr. Chairman. I am inclined to say, when you say that I am second to none, that all of us are second to Nunn on this committee. I just thought I would mention that. [Laughter.]

I really do not have an opening statement, but I do compliment you for holding these hearings. I do think the issues are extremely important, and they are ones that we are going to spend a lot of time on this year.

Senator EXON. Thank you, Senator Bingaman.

We will begin our testimony now.

Mr. Wade, we will call on you first. But first let me say, as I said in my opening statement, that you have been before us on many occasions. I speak for all of the members of the committee in thanking you for what you have done. If anyone has been key in this area, you are one of those who has been key from the administration's side.

It is my understanding that no determination has yet been made by the new administration, but at least this Senator, and many of us, would be very pleased to have you continue in your position under the new administration.

But, be that as it may, thank you for your past efforts, and I recognize you at this time.

STATEMENT OF TROY E. WADE II, ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS, DEPARTMENT OF ENERGY

Mr. **Wade**. Thank you for your very kind remarks, Senator Exon.

Today I will be discussing the current status of the Savannah River reactors.

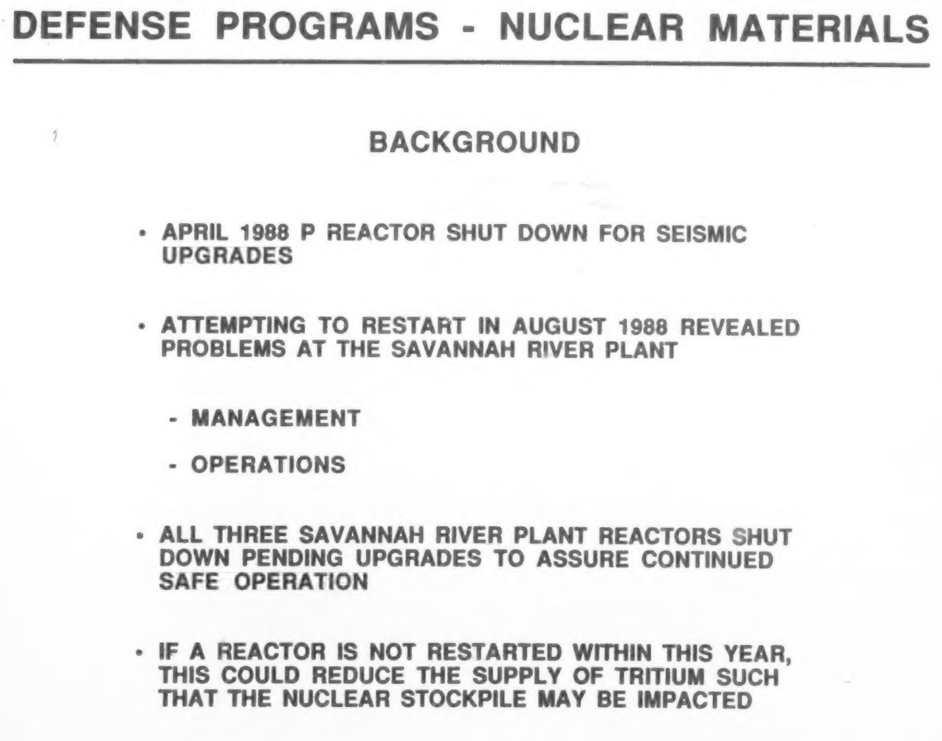
I have a statement for the record, and, with your permission, will submit it for the record.

Senator **Exon**. Without objection, it will be incorporated in the record.

Mr. **Wade**. A restart strategy has been established and agreed upon by DOE's safety oversight organization, the defense programs organization, the Savannah River Operations Office, duPont, and the key management of the planned Westinghouse organization at Savannah River.

This strategy and these plans are being reviewed and discussed with the Advisory Committee on Nuclear Facility Safety. There are under consideration and discussion with the Advisory Committee on Nuclear Facility Safety suggested changes to the criteria. As we progress on the reactor improvements, we will reassess the criteria as new information is generated.

As I proceed through the discussion today, we will address the strategy and we will also discuss lessons learned from some other incidents of the past.



DEFENSE PROGRAMS - NUCLEAR MATERIALS

BACKGROUND

- APRIL 1988 P REACTOR SHUT DOWN FOR SEISMIC UPGRADES
- ATTEMPTING TO RESTART IN AUGUST 1988 REVEALED PROBLEMS AT THE SAVANNAH RIVER PLANT
  - MANAGEMENT
  - OPERATIONS
- ALL THREE SAVANNAH RIVER PLANT REACTORS SHUT DOWN PENDING UPGRADES TO ASSURE CONTINUED SAFE OPERATION
- IF A REACTOR IS NOT RESTARTED WITHIN THIS YEAR, THIS COULD REDUCE THE SUPPLY OF TRITIUM SUCH THAT THE NUCLEAR STOCKPILE MAY BE IMPACTED

The Department of Defense's nuclear reactors are not currently operating. P reactor was shut down in April, 1988, for seismic upgrades. K reactor was shut down for its annual maintenance outage. L reactor was shut down in June, 1988, for its annual maintenance outage.

During the attempted restart of P reactor in August of 1988, management and operational problems were revealed, which resulted in the shutdown of P reactor to institute necessary improvements.

The Department will not restart these reactors until improvements are implemented, to ensure continued safe operation.

If a reactor is not restarted within this year, this could reduce the supply of tritium such that the nuclear stockpile could be affected. We will go through those numbers for the committee tomorrow morning in closed session.

EVOLVING FOCUS

- FOCUS HAS SHIFTED FROM IMMEDIATE RESTART TO ONE OF ACHIEVING MAXIMUM ASSURANCE THAT THE REACTORS CAN BE OPERATED SAFELY UNTIL NEW MATERIALS PRODUCTION CAPACITY IS CONSTRUCTED AND OPERATING

- DEPARTMENT IS FOLLOWING A TWO-PHASED COURSE OF ACTION:

  - NEAR-TERM--THOSE ACTIONS THAT MUST BE COMPLETED PRIOR TO RESTART

  - LONG-TERM--THOSE ACTIONS THAT FOCUS ON THE LONG-TERM SAFE AND RELIABLE OPERATION OF THE REACTORS

We have changed our focus. The Department now is following a two-phased course of action. We have shifted from worrying about the restart of a particular reactor to doing those things that will assure the continued safe operation of the three Savannah River reactors over a very long time, a decade, which is what is going to be necessary before new production capacity can be built.

We have near-term actions that must be completed prior to restart, and we have long-term actions that must be completed for the long haul.

NEAR TERM ACTIONS

- ASSURE COMPETENT AND EXPERIENCED MANAGEMENT FOR SAFE REACTOR OPERATIONS

- IMPLEMENT RESTART STRATEGY WHICH INCLUDES CRITERIA IN THE FOLLOWING BROAD AREAS:

  - DESIGN BASES AND SYSTEMS PERFORMANCE

  - HUMAN PERFORMANCE

  - MANAGEMENT SYSTEMS AND PRACTICES

  - DOE ONSITE TECHNICAL VIGILANCE AND MONITORING

The near-term actions we will take will provide competent and experienced management for safe reactor operation. We have developed restart criteria that are covering these four areas. One, in the area of design bases and systems performance, what does the plant look like? Do the plant drawings agree with plant piping, for example? Can it be analyzed?

Two, in the area of human performance, we will look at what do we need to do with operator training? What do we need to do to improve operator attitude?

Three, in the area of management systems and practices, these are procedures, both operational procedures and maintenance procedures, and the fact that you must adhere to those procedures.

Finally, we are taking steps to increase the technical competence of the field office staff and increase the presence of the independent environment, safety and health (ES&H) on-site representatives.

LONG-TERM ACTIONS

REACTOR SAFETY IMPROVEMENT PROGRAM (RSIP)

- PROCESS TO MANAGE THE ASSESSMENT OF SAFETY ISSUES AND IMPLEMENTATION OF IMPROVEMENT ACTIONS
- PROVIDES FOR THE SYSTEMATIC IDENTIFICATION, EVALUATION, AND RESOLUTION OF SIGNIFICANT SAFETY ISSUES
  - IDENTIFICATION/SCREENING ENSURES THAT SIGNIFICANT ISSUES ARE PROMPTLY ADDRESSED WHILE INSIGNIFICANT ISSUES ARE ELIMINATED
  - EVALUATION ENSURES TIMELY, FORMAL, DOCUMENTED CONSIDERATION OF SAFETY SIGNIFICANCE AND IMPACT
  - ISSUE RESOLUTION ENSURES THAT PLANS ARE DEVELOPED WITH SIGNIFICANT SENIOR MANAGEMENT INVOLVEMENT; MANAGED TO FORMAL SCHEDULES AND MILESTONES SO PROGRESS CAN BE TRACKED

RSIP WILL DEFINE A PHASED PROGRAM OF CONTINUING SAFETY IMPROVEMENTS TO ASSURE THE LONG-TERM SAFE OPERATION OF THE DEFENSE REACTORS.

In the long-term, those things that we must do to assure continued safe operation for a decade are shown. The reactor safety improvement program will be implemented to provide for the systematic identification, evaluation and resolution of significant safety issues.

I call your attention to the bullet that says that we will identify significant issues, address those promptly, and eliminate insignificant issues.

POTENTIAL CRITICAL PATH ISSUES

- SEISMIC RESISTANCE
  - ABILITY TO SHUT PLANT DOWN, REMOVE DECAY HEAT AND MONITOR CRITICAL PARAMETERS FOLLOWING A DESIGN BASIS EARTHQUAKE
- TECHNICAL BASELINE
  - VERIFY THAT PLANT CONFIGURATION MEETS SAFETY ANALYSIS REPORT REQUIREMENTS
- PRIMARY COOLANT SYSTEM INTEGRITY
  - ENSURE INTEGRITY OF REACTOR VESSEL AND PRIMARY COOLANT SYSTEM PIPING AND COMPONENTS
- POWER LIMITS
  - DEVELOP TECHNICAL BASIS FOR ESTABLISHING ACCEPTABLE POWER LIMITS FOR SPECTRUM OF LOSS-OF-COOLANT ACCIDENTS

Potential critical path issues include the following key technical issues that we are addressing right now: No. 1, is the seismic resistance of critical safety systems. Given a design-basis earthquake, a so-called Charleston earthquake, can the plant shut down and remove the decay heat necessary to protect the safety of the reactor itself and, therefore, the safety of the workers and the public?

No. 2, is the plant baseline—to ensure that we understand exactly what the plant is and that it meets the current safety analysis and the safety analysis requirements.

No. 3, is to ensure the integrity of reactor tank and piping, to ensure the integrity of the vessel, to do this with ultrasonic testing, quality assurance programs. Look at the welding. This is a 40-year-old plant and there is damage, some small damage, some medium damage, to the piping that is the result of 40 years of operation, and ensuring that that piping does have integrity.

Finally, and a major activity of ours, is doing what is necessary to develop the methodology for acceptable reactor power operating limits.

You will recall that in the last year of operation of the three reactors, we reduced the power levels down to less than 50 percent. We have a major activity underway to look at how we can, by either analysis or experiment, ascend back in power in those reactors to the point where we can assure the necessary supplies of tritium.

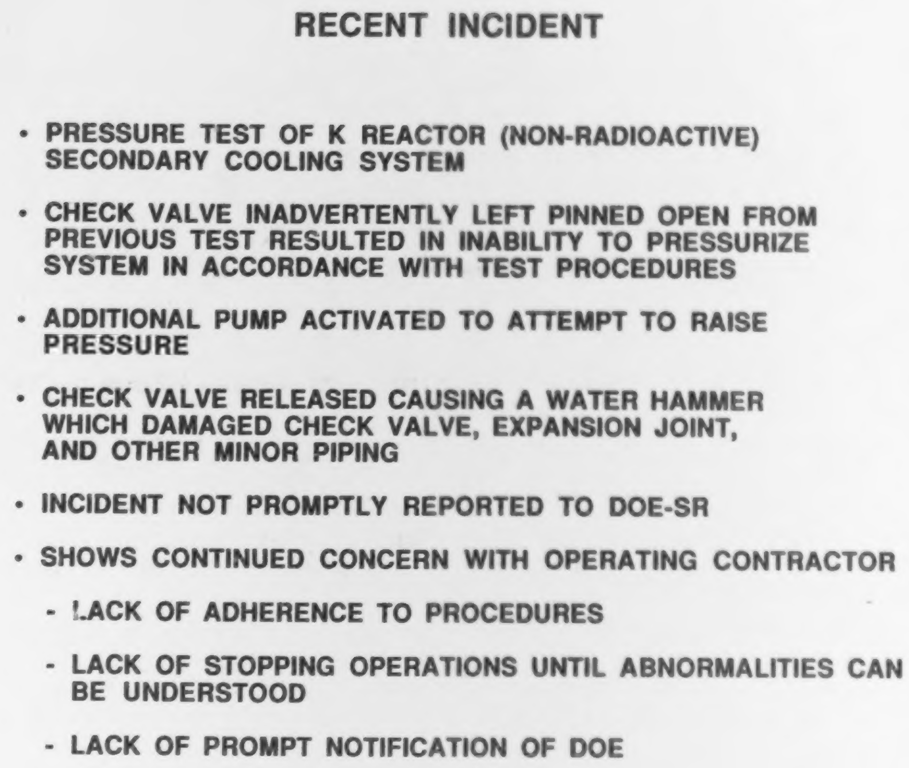
SCHEDULE

- **PRIMARY FOCUS IS ON THE RESTART OF K REACTOR**
- **DUE TO UNCERTAINTIES IN THE POTENTIAL CRITICAL PATH ISSUES, A RESTART SCHEDULE WILL BE DEFINED IN MARCH 1989**
- **L REACTOR AND P REACTOR WILL BE RESTARTED AFTER THE SUCCESSFUL RESTART OF K REACTOR**

In terms of schedule, the primary focus is on the restart of K reactor.

There was a large meeting a couple of months ago in Charlotte that involved program people, both from DOE headquarters, from the Savannah River Operations Office, from Mr. Starostecki's Environment, Safety, and Health organization, as well as consultants and the operating contractor, to come up with what was believed to be the necessary criteria for the restart of K reactor, some 166 items. Those restart criteria have been submitted to Dr. Ahearne's committee for review.

Once we have assessed Dr. Ahearne's comments, Mr. Starostecki's comments and what we have learned in the last couple of months, and added that to some of the independent things that Westinghouse will do, we hope that, in March, we will be able to come up with what is a firm restart date for K reactor, to be followed shortly after, hopefully, with L reactor, and finally with P reactor.



RECENT INCIDENT

- PRESSURE TEST OF K REACTOR (NON-RADIOACTIVE) SECONDARY COOLING SYSTEM
- CHECK VALVE INADVERTENTLY LEFT PINNED OPEN FROM PREVIOUS TEST RESULTED IN INABILITY TO PRESSURIZE SYSTEM IN ACCORDANCE WITH TEST PROCEDURES
- ADDITIONAL PUMP ACTIVATED TO ATTEMPT TO RAISE PRESSURE
- CHECK VALVE RELEASED CAUSING A WATER HAMMER WHICH DAMAGED CHECK VALVE, EXPANSION JOINT, AND OTHER MINOR PIPING
- INCIDENT NOT PROMPTLY REPORTED TO DOE-SR
- SHOWS CONTINUED CONCERN WITH OPERATING CONTRACTOR
  - LACK OF ADHERENCE TO PROCEDURES
  - LACK OF STOPPING OPERATIONS UNTIL ABNORMALITIES CAN BE UNDERSTOOD
  - LACK OF PROMPT NOTIFICATION OF DOE

There was a recent incident that got some publicity a couple of weeks ago.

On January 22, as a result of some testing that was being done in the secondary cooling system of the plant, a valve was inadvertently left open. When that system, with that valve open, was pressured, a water hammer occurred, which damaged a check valve, damaged an expansion joint, and some other minor piping.

We are concerned because that incident was not promptly reported to DOE Savannah River, and it does demonstrate some continued concern with the operating conditions down at Savannah River—lack of adherence to procedures; lack of stopping operations until abnormalities can be understood; and lack of prompt notification.

That incident is under investigation, and we will provide the investigative committee's report to this committee when it is complete.

SUMMARY

- DEPARTMENT HAS NEAR-TERM AND LONG-TERM PROGRAMS UNDERWAY TO ADDRESS SAFETY CONCERNS AT THE REACTORS
- MANAGEMENT AND OPERATIONS ARE A MAJOR FOCUS
- WE WILL ONLY OPERATE THESE PLANTS WHEN WE CAN ASSURE THE SAFE PRODUCTION OF NUCLEAR MATERIALS

In summary, Mr. Chairman, the Savannah River plant reactors are not producing material at present because of our uncertainty regarding the safety and the manner in which they can be operated.

Mistakes were made during operations that are unacceptable and will not be tolerated. And the reactors will not be operated until we are certain that they cannot recur.

We have both near-term and long-term programs underway to improve the safety and operation of the reactors. We understand and accept the responsibility and the necessity for the safe production of nuclear materials.

These incidents were brought to light because of this Department's aggressive attention to safety. We will continue to focus on the safe operation of our facilities. Our record shows that we will not operate unsafe plants and that we will take whatever actions are necessary to assure that the production of nuclear materials is safe.

We are in the midst of a transition of prime contractors at Savannah River, from Du Pont to Westinghouse. We are making an effort to assure the transition is as smooth as possible.

We welcome Westinghouse's expertise in the nuclear field.

With your permission, I would like to introduce Mr. Jim Moore, president of Westinghouse, Savannah River.

[The prepared statement of Mr. Wade follows:]

[Additional background charts provided will be retained in the committee file.]

STATEMENT OF
TROY E. WADE II
ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS
U.S. DEPARTMENT OF ENERGY

Mr. Chairman, members of the committee, I am pleased to appear before you to discuss the status of the Department of Energy's production reactors located at the Savannah River Plant.

The Department's defense nuclear reactors are currently not operating. Management attention is focused on restarting those necessary reactors only after a thorough safety review and approval process. A short history of the reactor situation will help put the Department's concerns into perspective.

History

In April 1988, the P Reactor was shut down for evaluation and upgrade of the seismic capability of its safety systems following the discovery of a potential deficiency in a brace in the L Reactor. At the same time, K Reactor was shut down for a normal scheduled refueling and planned maintenance outage. L Reactor was subsequently shutdown in June 1988 for its annual maintenance outage.

When attempts were made to restart P Reactor, operational problems were revealed which require management and worker performance improvements before we restart any of the Savannah River reactors. These improvements are underway. The Department will restart these reactors only when the improvements are made and verified and only if we are satisfied that the reactors can be operated safely.

The Department is committed to producing the nuclear materials required for the defense of our Nation in a manner that assures the protection of the public and our workers. The tritium producing reactors at the Savannah River Plant, including P Reactor, have been shut down since the Spring of 1988 -- no tritium has been produced since that time. These reactors are our only existing domestic source of tritium, which must be periodically replenished in order to maintain the effectiveness of our nuclear weapons stockpile. The need to operate our reactors to meet tritium demands is becoming critical. If a reactor is not restarted this year, then the supply of tritium could be reduced to such an extent that the nuclear stockpile may be affected. The Department will continue to apply the resources necessary to assure operational compliance with our environment, safety, and health policies while meeting our commitment to national security.

Strategy

The Department's focus has shifted from immediate restart to one of achieving maximum operating safety until new nuclear materials production capacity is constructed and operated. Therefore, the Department has adopted a course of action entailing both near-term actions, which must be completed prior to restart, and long-term actions, which focus on the safe and reliable operation of the existing reactors overtime..

Near-term actions will assure that there is competent and experienced management for safe reactor operations. The safety culture is undergoing change in the form of extensive procedure revision and related training associated with disciplined reactor operations. The transition of management and operating responsibilities to Westinghouse will ensure access to personnel resources with extensive nuclear experience. Focusing experienced resources to develop a strong management team is the key to future success.

In addition, the Department has a restart strategy that includes criteria in the following fundamental areas:

- design bases and systems performance;
- human performance;
- management systems and practices; and
- DOE onsite technical vigilance and monitoring.

Specific criteria have been developed in each of the above areas that will be satisfied prior to restart.

The Department is focusing its efforts on the restart of the K Reactor. The specific schedule for the restart of K Reactor is expected to be defined and announced in March of this year. The lessons learned at K Reactor will be applied to the other defense reactors.

Because of the numerous safety issues and areas of safety improvement that have been and continue to be identified, a long-term process, the Reactor Safety Improvement Program (RSIP), is under development to manage the assessment of these issues and implementation of improvement actions.

RSIP provides for the systematic identification, evaluation, and resolution of safety issues. Specifically:

-- identification/screening to ensure that significant issues are promptly addressed and priorities are followed;

-- evaluation to ensure timely, formal, documented consideration of safety significance and impact; and

-- issue resolution to ensure that plans are developed and work managed to formal schedules and plans so progress can be tracked.

RSIP will define a phased program of safety improvements over the next several years to help assure the long-term safe operation of the defense reactors.

Long-term objectives are being identified and the detailed safety improvement program will be relied upon to guide the integration of the specific issues with budget and schedule considerations. This will be an ongoing program that will be used to resolve all safety issues that arise in the future.

Status

The program to restart K Reactor is a complex undertaking that will require expert management to ensure that critical issues are corrected. The transition from du Pont to Westinghouse, which will take place April 1, 1989, is proceeding smoothly. Westinghouse has placed people with many years of commercial reactor experience in key management roles. The Department believes that Westinghouse's commercial reactor experience will prove invaluable to restoring proper operation of the Savannah River Plant reactors.

Restart criteria also have been identified in the four basic areas discussed earlier. There are 50 specific restart issues and requirements identified within these four areas. Each issue or requirement has acceptance criteria. There are a total of 166 individual criteria. These criteria are being discussed with the Advisory Committee on Nuclear Facility Safety.

The restart program plan has been developed, a task descriptions for each of the criteria has been completed, and task managers have been assigned to oversee the completion of each of the 166 criteria. Individual task schedules have been completed and a program control and tracking system is in place.

There are four identified issues that will determine the actual restart schedules. These issues, listed below, require that assessments of the reactor be made. Depending upon those assessments, the extent of modifications that will be required prior to restart will be defined. These are:

-- seismic resistance;
-- technical baseline;
-- primary coolant system integrity; and
-- power limits.

The question on seismic resistance is the ability to shut the plant down, remove the decay heat, and monitor the critical reactor parameters following a design basis earthquake. The technical baseline will verify that the actual plant configuration meets safety analysis report requirements. Primary coolant system integrity ensures the integrity of the reactor vessel and primary coolant system piping and components. For the power limits, it is necessary to develop a technical basis for establishing acceptable power limits.

These issues are being carefully studied. Preliminary determinations on the extent of work that needs to be completed prior to restart will be made in March 1989. At that time it may be possible to determine a schedule for restart of K Reactor.

Recent Incident

On Sunday, January 22, 1989, a pressure test of the K Reactor (nonradioactive) secondary cooling system was performed. A check valve, inadvertently left pinned open from a previous test, resulted in the inability to pressurize the system in accordance with test procedures. An additional pump was activated in an attempt to raise pressure without understanding why the sytem would not pressurize, with the activation of the second pump, the check valve released, causing a pressure surge which damaged the check valve, an expansion joint, and other minor piping. The incident was not promptly reported to the Savannah River Operations Office, but rather was reported in a routine written report to the Savannah River Operations Office on Monday morning.

This incident is illustrative of the reasons DOE continues to be concerned with the operational safety of the SRP reactors, particularly in three areas:

-- lack of adherence to procedures;
-- lack of stopping operations until abnormalities can be understood; and
-- lack of prompt notification of DOE.

Defense Programs and the Savannah River Operations Office has chartered a review team to investigate this incident. It is headed by Phil Hamric, an Assistant Manager from the Idaho Operations Office, who headed the review of the P Reactor incident last August. The results of this investigation will be reported to the Congress.

Conclusion

The Assistant Secretary for Defense Programs has the responsibility to ensure that the restart program is implemented successfully. Independent oversight and verification of the restart operations are being performed by the Assistant Secretary for Environment, Safety and Health. The Advisory Committee on Nuclear Facility Safety also is providing independent reviews and recommendations regarding the defense reactors.

The Savannah River Plant reactors are not producing material at present because of our uncertainty regarding the manner in which safety policies were being administered. Mistakes were made during operations that are unacceptable and will not be tolerated. The reactors will not be operated until we are certain that these mistakes will not reoccur. We understand and accept the responsibility and necessity for the safe production of nuclear materials.

These problems were brought to light because of the Department's increased attention to safety. We will continue to focus on the safe operation of our facilities. We will take whatever actions are necessary to assure the safe production of nuclear materials.

Senator EXON. Thank you.

Mr. Moore.

STATEMENT OF JAMES S. MOORE, PRESIDENT, WESTINGHOUSE SAVANNAH RIVER CO.

Mr. MOORE. Thank you, Mr. Chairman and Senators. Good morning.

I am James Moore. I am president of the Westinghouse Savannah River Co., which is a wholly owned subsidiary of the Westinghouse Electric Corp. This has been established solely to perform the Savannah River management and operating contract for the U.S. Department of Energy.

As you know, beginning April 1, we will manage and operate the Savannah River facilities. I would like to thank you for the opportunity this morning to meet with you and express our views. I will present a somewhat abbreviated version of my prepared testimony, which I would like to submit for the record.

Senator EXON. Without objection, that will be included in the record.

Mr. MOORE. Thank you.

In this first appearance before your committee, I'd like to give you an overview of the team that will perform this mission and briefly report on our transition status, and discuss our plans for managing the challenges that we see at Savannah River.

First, perhaps a few words on my background. I have 24 years experience managing large organizations, and before my present position, I was vice president and general manager of the Government Operations Business Unit, which had four Westinghouse divisions responsible for DOE sites reporting directly to me.

From 1981 to 1986, I was vice president and general manager of the Westinghouse Water Reactor Divisions, 13 divisions with more than 12,000 employees. During that time, the Water Reactor Divisions had annual sales of between $1 billion and $2 billion and responsibility for providing services to some 177 nuclear plants worldwide.

I have also held various project and engineering management assignments during my 32 years with Westinghouse. For several years, I led Westinghouse's interaction with the Atomic Energy Commission, and later with the U.S. Nuclear Regulatory Commission, to develop many of the regulatory and safety standards which are practiced today, in the commercial nuclear industry.

For Savannah River, we have combined the best managers in Westinghouse's commercial nuclear business with some of the most outstanding managers in our Government programs, and that includes the Navy Nuclear Program.

Our key personnel average 19 years management experience, 26 years technical experience, and 22 years of environmental, safety, and health experience. Three out of four have advanced degrees, and 3 out of 10 have doctorates.

We have also included skilled incumbents at Savannah River, the Du Pont people, as part of our senior management team, to ensure a continuity of existing operations. So this combined team has the depth and breadth of experience to work successfully with DOE to obtain the desired quality production results and to do it within the strictest environmental, safety, health, and security demands.

Since the announcement last September 8 that we had been selected for the Savannah River contract, we have begun preparing to undertake this responsibility. I'd like to say that we have had the full cooperation of DOE and Du Pont since that announcement.

The objective of our transition plan is to assure that we are ready to assume responsibility at Savannah River on April 1. We have identified 17 readiness criteria that we believe must be examined to give us, Westinghouse, that assurance.

So, every member of my staff and his organization is looking at each of these 17 criteria as it relates to his operation. All together, at this point, we have about 200 people working on this. Based on our work to date, we have identified no potential issues that would prevent the smooth transition from Du Pont to us on schedule.

Since the restart of the reactors at the site became an issue, we have also participated in the Reactor Restart Program, although Du Pont continues to lead that responsibility until April 1.

We at Westinghouse initiated an independent safety review of the reactors, and our assessment will provide an extra level of understanding of the reactors and that will be completed in March.

Now, I would like to comment briefly on the challenges, as we see them, and our planned approach to managing and operating Savannah River. Most of the issues are, I think, well-known to you. The reactors are aging, and DOE has made the decision to construct a new heavy water production reactor at the site.

But in the meantime we must help DOE achieve the correct balance between the continued safe production of tritium and the remediation and protection of the site from the nuclear and chemical waste byproduct necessary from the processes.

As Troy Wade indicated, some of the restart criteria for the reactors remain under challenge and new issues have continued to emerge in an environment of increased public attention.

We will deal with this by providing complete and responsive information.

We all know the challenges at Savannah River didn't accumulate in a year. Some of them have been growing for decades, as has been indicated earlier. It will require some time for us to respond fully and responsibly.

Certainly, some of these issues can be addressed more rapidly, but none of them can really be accomplished overnight. So, we are establishing priorities and we will address the most pressing issues first.

This is a practice that has worked well in the commercial nuclear industry, particularly for older plants in the commercial environment, where we have plants that are 20 or 25 years old.

Savannah River does have an excellent safety record, and, once again, we expect, we believe that the formalized and disciplined process and procedures of the commercial nuclear industry are the best way to build on that record. This will be our first priority.

Working within that philosophy, we will establish a program to identify measurable objectives and guide our progress toward them.

Our basic approach to Savannah River will be to take full advantage of the existing strengths at the site, and, at the same time, to add the key new elements which we believe are required.

We're going to follow six basic principles, which I would like to outline.

The first is stand-alone management and support capability. We have organized to ensure that all of the necessary resources for safe and effective operation of Savannah River will be available locally. This is not the case with the duPont operations, where there are three different lines of command going up to Wilmington and I think some four or five levels of management before they ever come to a single point.

Under Westinghouse, I will report directly to the executive vice president at Westinghouse who has responsibility for all of Westinghouse's nuclear activities, including the DOE sites that Westinghouse runs. This will ensure that I get the corporate resources as I need them to accomplish our mission.

But the decisionmakers with responsibility for Savannah River will be at the site full-time.

The second principle is well-defined lines of responsibility. The vice president and general manager of the Operations Division will have sole responsibility for the safe operation of the reactors. There is no question where this buck stops. Our other divisions will have the same clarity of mission and responsibility.

The third principle will be clear safety policies and principles site-wide.

We have formed a new organization at SRP—it does not exist now—a dedicated, Environmental, Safety, Health and Quality Assurance Division at the site, to develop and gain acceptance of our fundamental safety strategy and objectives.

We will not hesitate to interrupt or shut down any operation if we think it is necessary.

Tom Anderson, our vice president of ES&H and QA, will also have the authority to shut down any operation, as well as me.

The fourth principle will be an issue management process that establishes a systematic, formalized, and thorough process for identifying, evaluating, and resolving significant safety issues. Troy Wade touched on that earlier in his discussion.

Our fifth principle of management will be formal performance assessments to evaluate the operation's effectiveness of quality, safety, and environmental practices, particularly at the reactors.

Finally, we will establish clear responsibilities and interfaces with the oversight organizations. Westinghouse intends to assume the lead role for identifying oversight issues and recommending action plans for their resolution.

We will develop mutually acceptable review schedules, and we will interact with review groups to determine the scope of their reviews and what they require from Savannah River. We are going to try to manage the process.

I hope you will agree that a management approach based on these six principles, stand-alone management capability at the site, well-defined lines of responsibility, clear safety policies and principles, and formal management processes to resolve safety issues, continuing performance assessments, and well-defined interfaces with oversight groups, will be sound and strong.

We accept and we welcome the challenge to make the Savannah River plant a center of excellence for DOE operations.

I would like to thank you again for the opportunity to appear before your committee, and I look forward to many substantive and productive meetings with you as a committee and individually in the future.

Thank you.

[The prepared statement of Mr. Moore follows:]

TESTIMONY OF JAMES S. MOORE, PRESIDENT
WESTINGHOUSE SAVANNAH RIVER COMPANY

Thank you, Mr. Chairman. Senators:

I'm James S. Moore, president of the Westinghouse Savannah River Company --- a wholly owned subsidiary of Westinghouse Electric Corporation --- established solely to perform the Savannah River Management and Operating contract for the United States Department of Energy.

I want to thank you for this opportunity to meet with you and express our views.

In this first appearance before your committee, I'd like to give you an overview of the team that will perform this mission, briefly report on our transition status, and discuss our plans for managing the challenges we see at Savannah River.

I have 24 years' experience managing large organizations. At Westinghouse, I've been general manager of the Nuclear Fuel division; vice president and general manager of the Government Operations business unit with four divisions responsible for DOE sites reporting directly to me; and vice president and general manager of the Water Reactor divisions --- 13 divisions with more than 12,000 employees, annual sales of between one and two billion dollars, and responsibility for providing services to 177 nuclear plants worldwide.

I've also held various project and engineering management assignments during my 32 years with Westinghouse --- many in highly technical programs such as nuclear safety. You'll find more information on my career in a biography attached to this testimony.

For Savannah River, we've combined the best managers in our commercial nuclear business with some of the most outstanding managers in our government programs --- including the Naval nuclear program. Our key personnel average 19 years' management experience, 26 years' technical experience, and 22 years' environmental, safety and health experience. Three out of four have advanced degrees; three out of 10 have doctorates.

We've also included skilled incumbents at Savannah River to ensure continuity of existing operations. This combined team has the depth and breadth of experience to work successfully with DOE to obtain the desired quality production results --- and to do it within the strictest environmental, safety, health and security demands.

Since the announcement last September 8 that we had been selected for the Savannah River contract, we have begun preparations to undertake this responsibility. We have had the full cooperation of the DOE and DuPont since that announcement.

The objective of our transition plan is to assure that we are ready to assume responsibility at Savannah River on April 1. Following our commitment to a disciplined approach, we've identified 17 readiness criteria that we believe must be examined. Every member of my staff and his organization is looking at each of the 17 criteria as it relates to his operation. Altogether, we have about 200 people working on this.

As we identify issues, we develop any actions required. This is a process that begins with functional line managers, surfaces issues, and results in a top-level assessment of our readiness to take over. We're still in this process, but based on our work to date, we have identified no potential issues that would prevent the smooth transition from DuPont to us on schedule.

Since the restart of the reactors at the site became an issue, we've also participated in the reactor restart program --- although DuPont continues to lead that responsibility. We initiated an independent safety review of the reactors. Our team is chaired by senior Westinghouse personnel and outside experts knowledgeable in reactor operations. Our assessment will provide an extra level of understanding of the reactors, and will be completed in March.

Now I'd like to comment briefly on the challenges as we see them, and somewhat more fully on our planned approach to managing and operating Savannah River.

Our overall challenge is to manage the response to the rapidly changing and complex issues that now confront the Savannah River site. Most of these issues are well known to you. The reactors are aging and DOE has made the decision to construct a new heavy water production reactor at the site. This will be one of the most significant construction projects in the country.

In the meantime, we must help DOE achieve the correct balance between the continued safe production of tritium necessary for the country's defense, and the protection and remediation of the site from the nuclear and chemical waste by-products of the processes.

Some of the restart criteria for the reactors remain under challenge, and new issues have continued to emerge from evaluations. We must manage these challenges in an environment of increased public attention.

As the world leader in the design and development of water reactors, with a total of 2,000 reactor-years' experience, Westinghouse has developed a long-standing practice of working with regulatory bodies by providing complete and responsive information.

The challenges at Savannah River didn't accumulate in a year. Some of them have been growing for decades. And it will require some time for us to respond fully and responsibly. Certainly some of them can be addressed more rapidly --- but none will be accomplished overnight. We will establish priorities and address the most pressing issues first. This is a practice that has worked well in the commercial nuclear industry.

Savannah River has an excellent record of safety. Once again, we believe the formalized and disciplined processes and procedures of the commercial nuclear industry are the best way to build on that record. That will be our first priority. And working within that philosophy, we will establish with DOE a program to identify measurable objectives, and to guide our progress toward them.

Our basic approach to Savannah River will be to retain and take full advantage of existing strengths at the site, and at the same time add the key new elements we believe are required to meet the challenges of the 1990s. We will follow six basic principles of management:

The first is stand-alone management and support capability. We are organized to ensure that all the necessary resources for safe and effective operation of Savannah River will be available locally. All divisions at the site --- from reactor operations, to the Savannah River Laboratory, to a division to manage the construction of the New Production Reactor --- will be staffed by seasoned managers who will report directly to the senior Westinghouse officer at the site. That's me.

And I'll report directly to the executive vice president at Westinghouse who has responsibility for all Westinghouse nuclear operations, including the DOE sites Westinghouse runs. This ensures that the corporate resources of Westinghouse are available to us. But the decision-makers with responsibility for Savannah River will be at the site full time.

The second principle is well-defined lines of responsibility. The vice president and general manager of the Operations division will have sole responsibility for the safe operation of the reactors. He'll also have responsibility for engineering and performance assessments on the reactors, and will have the resources to accomplish his mission. There's no question where this buck stops. And our other divisions will have the same clarity of mission and responsibility.

The third principle will be clear safety policies and principles. We've formed a dedicated Environmental, Safety, Health and Quality Assurance division at the site to develop and gain acceptance of our fundamental safety strategy and objectives. They will be derived from our experience in the commercial nuclear industry and DOE's draft safety policy, plus relevant special considerations for Savannah River. Westinghouse management will not hesitate to interrupt or shut down any operation if we think it's necessary. Tom Anderson, our vice president of ESH & QA, will have shut-down authority as well as me.

The fourth principle will be an issue management process that establishes a systematic, formalized and thorough process for identifying, evaluating and resolving significant safety issues. This process will involve senior management in the reactor safety improvement program. It will ensure that issues are tracked from identification through resolution. It will also set priorities, define work scopes, schedules and milestones, and issue status reports.

Our fifth principle of management will be formal performance assessments to evaluate the operations effectiveness of quality, safety and environmental practices at the reactors. The responsible program manager will identify issues requiring corrective actions, define the formal mechanism for continuously measuring effectiveness, and feed this information directly to the reactors manager.

Finally, we'll establish clear responsibilities and interfaces with oversight organizations. Westinghouse will assume the lead role for identifying oversight issues, recommend action plans for their resolution, and gain DOE/Savannah River approval. We'll develop mutually acceptable review schedules, and interact with review groups to determine the scope of their reviews, and what they require from Savannah River.

Besides the government oversight groups, the National Academy of Sciences and the National Academy of Engineering recommended --- and Westinghouse has established --- an independent Nuclear Safety and Environmental Oversight Committee to visit Savannah River annually to examine site safety and environmental soundness.

I hope you'll agree that a management approach based on these six principles --- stand-alone management capability at the site, well-defined lines of responsibility, clear safety policies and principles, formal management processes to resolve safety issues, continuing performance assessments, and well-defined interfaces with oversight groups --- will be sound and strong.

Thank you again for this opportunity to appear before your committee. I look forward to many substantive and productive meetings with you --- collectively and individually --- in the future.

Senator **Exon**. Mr. Moore, thank you very much.

Before we proceed to our next witness, we have been joined by Senator Cohen.

Senator Cohen, do you have any opening remarks that you would like to make?

Senator **Cohen**. Thank you, Mr. Chairman, but I do not.

Senator **Exon**. Thank you, Senator Cohen.

We will proceed next, then, to Mr. Starostecki. Please proceed, sir.

STATEMENT OF RICHARD W. STAROSTECKI, DEPUTY ASSISTANT SECRETARY FOR SAFETY, HEALTH, AND QUALITY ASSURANCE, DEPARTMENT OF ENERGY

Mr. **Starostecki**. Well, sir, I don't have a prepared statement, other than to try to support what the Department is doing in terms of safety.

My role within the Department is a safety advocate. We have come forward with a recognition that experience shows that a safe plant will also give you a reliable plant. We are looking at safety for the Savannah River reactors and other facilities in the complex that are aging, that they operate over the long-term.

It is not sufficient to say that the reactors will be safe 1 day, 1 week or 1 month.

We are identifying technical issues that need to be addressed now and over the long-term.

The National Academy of Sciences in October 1987, clearly said that our technical capabilities are diminishing. We need to be more vigilant in finding the problems before the problems find us.

I think it is in a proactive posture that we are taking the kinds of actions that we are doing now. This is sometimes difficult to understand. We are not waiting for an accident to happen. We recognize that old equipment will break down, and we are trying to have a system in place where the line management can deal with those problems when they arise.

I would be happy to answer any questions that the committee will have.

Senator **Exon**. Thank you.

I am sure there will be some questions of you when we go to the questioning period because certainly you bear some tremendously heavy responsibility in this whole safety area, that is a major concern, along with the others we have outlined.

Dr. Ahearne, we are pleased to recognize you at this time. To save your time, I would say that we appreciate your being here this morning. We appreciate the statement that you have submitted for the record. That statement, in its entirety, without objection, will be accepted as part of the record at this time.

We would like to have you summarize in any fashion that you would like.

STATEMENT OF JOHN F. AHEARNE, CHAIRMAN, ADVISORY COMMITTEE ON NUCLEAR FACILITY SAFETY, DEPARTMENT OF ENERGY

Dr. **Ahearne**. Thank you, Senator Exon.

In the statement that I have submitted, I have attached two fairly lengthy reports—one to Secretary Herrington and one to the Armed Services Committee. I won't even refer to those, but I would be glad to answer any questions on those if you have them.

As I indicated in my statement, I am here as the chairman of the Advisory Committee. So do believe it appropriate to restrict my comments to those areas which fall under the committee's charter. Those are, explicitly, safety issues. So I will not address the DOE budget or the environmental cleanup.

We have addressed the DOE's plans to restart the Savannah River reactor and the most complete description of our position is included in the letter of December 14 to the Secretary, with additional comments which were included in the letter to the Armed Services Committees.

As we said in our December 14 letter, we have broad concerns regarding safety philosophy and the overall criteria for restart and management.

Now, I do have to recognize that we looked at a snapshot as of the beginning of December, and a number of things have happened since then, not the least of which is Westinghouse becoming more heavily involved in this whole process.

At the time, we were trying to address—as I said in that snapshot—we were uncertain in our list as to whether all the technical problems had been identified. We certainly saw the broader issues which we talked about. But, as far as the detailed, technical problems, we did not spend that much time digging into a detailed review.

We did point out that we had found a weakness in the ultrasonic testing area and, as had been recently demonstrated in the water hammer event, it is possible that additional technical problems may arise due to poor practices.

We do not have any estimate on how long the resolution will take or how much the fixes will cost.

Now, at least in theory, the engineering problems can be handled using engineering solutions. As was the case with the C reactor a few years ago, the solution may be prohibitively expensive. But we have not seen such a problem.

The broader issues can also be handled, but the approach is less obvious then with engineering problems. For example, we addressed the issue of what criteria to use.

We suggested that comparable to commercial standards is a reasonable objective. But it is very difficult to implement quantitatively.

Our conclusion was that the effective implementation of a nuclear safety policy will have to be largely subjective, involving the corporate judgments of responsible people knowledgeable about both the DOE and the commercial worlds.

We also believe that DOE had to devote more effort to determining what actions are truly necessary for restart and what are necessary over the longer term. My sense, from what I know and from what we have heard this morning, is that that is a direction in which DOE is working.

On the management issues, we concluded the Department should be maintaining its distinction between management and oversight.

We agreed with a draft Department policy statement that clear, unambiguous lines of authority should be established.

We did not find that to be the case. We do believe, however, that management can be strengthened and authority made clear. I expect the new Secretary, who comes from years of working in a large organization which is based upon clear authority responsibility and accountability, will move quickly to address those problems.

We have not examined how serious is the near-term requirement for tritium. We are examining safety issues. We are not unlike the Nuclear Regulatory Commission's approach to commercial reactors.

As the D.C. Court of Appeals recently said, safety must be examined before economics.

Similarly, we look at safety. The need must be examined elsewhere. Consequently, we are not able to address whether the reactors will be ready in the phrase that is frequently used, "when needed."

The issues being addressed by this committee and others of the Congress—Senator Glenn's, for example—are quite large, as you know. A major question is can the DOE implement all the actions for repair, restart, and safe operation of the facilities, handle the cleanup problems at the many facilities that have been described—for example, the December report that the Senator referred to—and also manage the design construction of one or two new design production reactors.

Those problems took many years to develop and they will take many years to resolve.

There have been over many years, certainly putting them in current dollars, billions of dollars unspent. It should be no surprise that it will take billions of dollars to resolve the problems.

Also, as we know from other technology based systems, such as space and commercial nuclear power, and many of the systems under the purview of this committee in the defense area, deferring attention to problems increases the costs of their solution.

For problems of the magnitude of those that are discussed, care has to be taken to developing solutions to avoid wasting large amounts of money and time. I was glad to hear you, Senator Exon, in your opening remarks point out that it is not clear that money alone will correct all these problems and that we have to guard against just throwing money at the problems. That is absolutely true.

A baseline has to be established so that a solid knowledge is developed of what is currently the status. The Department has to establish what are the safety standards. In that case, I hope we have moved beyond the days of zero risk being the criterion.

The Department and Congress I believe have to work out the relationship of the new Nuclear Safety Board, the mini-NRC, that you established last year and the Health Safety and Environmental organization of the DOE, for example, represented by Mr. Starostecki.

Both groups have staffs of about 100 people aimed at overseeing the defense production facilities. Both will have inspectors resident at the sites. Both will establish overall safety policy. Both will inspect to see that regulations are followed. And both are to bring to the Secretary recommendations for action.

Unless careful thought is given to how these two relate, they may become adversaries and delay improvements and cause imprudent use of resources.

Now, in particular, the new Secretary is about to come in and I will expect will bring in new key people. Senator Glenn asked me a question last week which I was not really prepared to answer. That was the question about putting HS&E in statutorily.

The more I have tried to think about that and also other initiatives that I understand may be taken to change the charter of the Nuclear Safety Board, it occurs to me that perhaps—and this is now a personal note, and I'm not speaking here for my committee—you could give Admiral Watkins some time, for example, perhaps 6 months, to see how well can he make the current system work before changing the system that he is trying to work with.

Finally, I want to comment on the January 30 letter from one member of this committee, Senator Wirth, and Representative Skaggs, to Secretary-Designate Watkins. This is a personal comment.

Last night, I received a copy of the letter from the DOE. The letter contains some very kind remarks about me in conjunction with the new Nuclear Safety Board. But I have to make a few comments.

First, the letter was a total surprise to me. I have not discussed the Board or the possibility of my being on it with either Senator Wirth or Representative Skaggs, nor, to the best of my recollection, with any member of their staffs.

Second, it is true that I am leaving Resources for the Future and I'm job hunting. But I am not attempting to locate with the Nuclear Safety Board. I am trying to look for a position with the academic world.

Finally, as some of the members of this committee know, I have testified several times on the concept of independent regulatory oversight of the DOE facilities. I testified in favor of the concept. I remain in favor of the concept.

However, I also testified that I believe a commission or a board structure is a mistake, both for this board and for the Nuclear Regulatory Commission. I have been and remain a strong supporter of a single administrator for the NRC.

I also testified that the function of the Nuclear Safety Board I believe would be better located in the NRC. As a result, I am not interested in being appointed to the Board, and if I were nominated, I would refuse. But I do thank the gentlemen for their very kind words.

That completes my prepared testimony. I would be glad to answer any questions which you may have.

[The prepared statement of Dr. Ahearne follows:]

PREPARED STATEMENT OF JOHN F. AHEARNE, VICE PRESIDENT, RESOURCES FOR THE FUTURE AND CHAIRMAN, DEPARTMENT OF ENERGY, ADVISORY COMMITTEE ON NUCLEAR FACILITY SAFETY

Mr. Chairman and Members of the Committee, I am pleased to respond to your invitation to testify on issues concerning the restart of the Department of Energy's Savannah River reactors. Since I am here in my capacity as Chairman of the Advisory Committee on Nuclear Facility Safety, I believe it appropriate only to address those issues which the Advisory Committee charter identifies as within our scope, and, in particular, those issues which the Committee itself has addressed. As indicated by our title, our Committee's charter extends to safety concerns with respect to the Department of Energy's facilities. Thus, for example, I will not address the DOE budget or environmental cleanup.

The Advisory Committee has addressed the DOE's plans to restart the Savannah River reactors. The most complete description of our position on the restart status is in the attached letter of December 14 to the Secretary, providing the Advisory Committee's comments on the Department's Restart Strategy document. Also attached is the Advisory Committee's letter of December 14 to the Chairman of this committee providing additional background information.

As discussed in the December 14 letter to Secretary Herrington, our committee has "broad concerns regarding safety philosophy, the overall criteria for restart, and management." Although we described several technical problems, we concluded the DOE had given less attention to these broader areas.

We are uncertain as to whether all technical problems have been uncovered. As was recently demonstrated in the water hammer event, other technical problems may actually be caused by poor operating practices. The technical problems, including cracking, are being worked on. We do not have an estimate as to how long resolution will take or of how much will the fixes cost. At least in theory, these are engineering problems which can be handled using engineering solutions. Of course, as was the case with the C reactor a few years ago, the solution may be prohibitively expensive. We have not yet seen such a problem.

The broader issues we raised also can be handled, but the approach is less obvious than with engineering problems. We addressed the issue of what criteria to use and suggested "that 'comparable to commercial standards' is a reasonable objective, but difficult to implement quantitatively." We concluded "effective implementation of a nuclear safety policy must be largely subjective, involving the corporate judgments of responsible people knowledgeable about both [the DOE and the commercial] worlds." However, we believe the DOE must devote more effort to determining what actions are truly necessary for restart and what are necessary over the longer term.

On the management issues, we concluded "The Department should maintain the distinction between management and oversight." We agreed with a draft Department Policy statement that "clear unambiguous lines of authority" should be established, but did "not find that to be the present situation. . . ." Management can be strengthened and authority made clear. I expect the new Secretary, coming from years of running large organizations based upon clear authority, responsibility, and accountability, will move quickly to address the management problems.

My committee has not examined how serious is the near-term requirement for tritium. We are examining safety issues, not unlike the NRC's approach to commercial reactors, where, as the D.C. Court of Appeals recently said, safety must be examined before economics. Similarly, we look at safety. The need must be examined elsewhere. Consequently, we are not able to address whether the reactors will be ready "when needed".

The issues being addressed by this Committee and others of the Congress, and by the Department are, as you know, large. A major question is can the DOE implement all the actions for repair, restart, and safe operation of the facilities described in recent reports, and manage design and construction of one or two new design production reactors. The problems took many years to develop, decades; they will take many years to resolve. There have been, certainly in inflated dollars, billions unspent. It should not be surprising that the problems will take billions to resolve. Also, as we know from other technology-based systems, such as space and commercial nuclear power, deferring attention to problems increases the costs of their solution.

For problems of the magnitude of those being discussed, care must be taken in developing solutions to avoid wasting large amounts of money and time. A baseline should be established so that solid knowledge is developed of what is the current status. The Department must establish what are to be the safety standards. I hope that we have moved beyond the days of zero risk being the criterion. While this does have a certain attractiveness, operating any system introduces some risk and running any system requires a balancing between hazards and benefits.

Finally, the Department and Congress should work out the relationship of the new mini-NRC, the nuclear safety board you established last year, and the Health, Safety, and Environment organization of the DOE. Both groups have a staff of about 100 people aimed at overseeing the defense production facilities. Both will have resident inspectors, establish overall safety policy, develop regulations, and inspect to see those regulations are followed. And both are to bring to the Secretary recommendations for action. Unless some careful thought is given to how these two relate, they may become adversaries, delay improvements, and cause imprudent use of resources.

This completes my prepared testimony. I will be glad to answer any questions the Committee may have.

[The attachments to Dr. Ahearne's statement already appear as inserts during Senator Exon's statement.]

Senator **Exon**. Thank you, Warren G. Harding. [Laughter.]

We appreciate your statement very much. I thank all of our panelists.

I would ask that the staff advise me of the time and we will start our round of questioning now. We will allow 5 minutes on the first round and will move along as quickly as we possibly can.

Just let me start out by saying that I think all members of the committee were very pleased with the President's recommendation to the Senate for confirmation of Admiral Watkins. We think this, more than anything else that we have received from the new administration, was the signal that indicates we will see an emphasis on correcting the problem.

Let me begin the questioning with Mr. Wade.

REPROGRAMMING ACTION

Mr. Wade, as I understand it, the Department of Energy has asked for reprogramming of several different funds from the Office of Management and Budget. I would like to ask you if that is so.

If it is so, would you not agree that, as far as reprogramming of funds is concerned, there could be no higher priority at the Department of Energy than reprogramming funds to assist in the restart safely of the Savannah River facility?

Mr. **Wade**. That's correct, Mr. Chairman.

We prepared a reprogramming action within the Department. The total was $256 million. This included a large increment for continuing the upgrades at Savannah River and some other additions elsewhere in the Defense Programs system. For example, we requested some additional funds for ES&H activities at both Hanford and Idaho.

I am pleased to report that that reprogramming action has gone from the Department. It is currently under review at OMB. It is my understanding, and our hope, that there will be prompt action and that it will be up here for the consideration of Congress very shortly.

Senator **Exon**. Thank you.

EXCELLENCE VERSUS COMPLIANCE

Mr. Starostecki, you have talked about the difference between excellence and compliance at the Nuclear Weapons Complexes. Since you did not have an opening statement but since we want to give you time to give us your viewpoints on anything that is on your mind, let me begin this discussion by asking if you and please elaborate, if you will, and indicate what you think the Department of Energy's goal should be in this regard, excellence versus compliance.

Mr. **Starostecki**. Yes, sir. I'd be glad to.

I've been with the Department for 13 months, so most of my background relates to my experience in the Navy and in the commercial sector.

When I reflect back on the positions I have had in the Nuclear Regulatory Commission, as an example, and I look at the experience in the commercial sector, the notion of compliance and establishing a prescriptive set of very detailed, elaborate requirements does not necessarily assure safety in that that does not prevent accidents.

The Browns Ferry fire occurred because of somebody doing an inadequate procedure with a candle.

The Three Mile Island accident happened in spite of the fact that we had an awful lot of sophisticated systems in the plants.

When you reflect on the experience since Three Mile Island and what has happened in the commercial sector, there has been the recognition that safety performance is not assured solely by compliance with a minimum set of requirements. In fact, one has to go beyond minimum.

In fact, the commercial sector, the utilities, established the Institute of Nuclear Power Operations, or INPO, to establish standards of excellence which reflect the best practices the industry has to offer.

It is the dialogue that has been created by INPO to identify better practices, where the owner-operators of the commercial reactors are encouraged to be technically inquisitive, to find problems such that they can be resolved before they degenerate into more serious situations, that has been most effective.

Similiary, the Nuclear Regulatory Commission encourages safety performance and excellence through a programmed systematic assessment of license performance. They diagnose a utility's performance and issue them, in essence, a report card once a year.

In is not our goal just to have compliance with a minimum set of requirements. For older facilities, we cannot rely solely on hardware and systems that become very complex to assure safety. For a short while, reliance on systems and hardware is acceptable. But, as plants get older, we need to rely on knowledgeable and skilled people and the management systems to give us better procedures.

So, in this regard, we need to recognize, as I think has been seen in the commercial sector, that we have to have higher and rising expectations of what our performance should be.

We need to be better next year than last year. This is a developing technology. There are new problems being found almost every year. They are, in fact, manageable, and a preoccupation with some of these technical issues will distract us from what I think has been found the most productive improvement to safety, and that is encouraging a safety and environment work ethic that reflects on a management commitment and involvement to have safety as the underlying philosophy of day-to-day operations.

So, in this regard, it is a balance between compliance with minimum requirements and a reflection that we may not necessarily be able to conform to all the best practices at all the time. But, I think as the nuclear Navy has shown, as you strive for those best practices, you will get better and, in fact, that provides the best defense in depth for any anomalies or accidents that will occur.

Senator EXON. Thank you. My time is up.

I am going to go to the next Senator.

I would like to ask any of you, certainly Dr. Ahearne and Mr. Moore, if you have any input that you think is important on any of these questions, that you give it to us. We are not delegating these questions to just one of you. We generally will direct them, but we want you all to please feel free to jump in.

With that, I am pleased to recognize Senator Thurmond.

RESTART OF SAVANNAH RIVER REACTORS

Senator THURMOND. Thank you very much, Mr. Chairman.

Mr. Wade, you note in your testimony that, following the P reactor restart, operational problems were revealed which require management and worker performance improvements.

Is it your view that technical and equipment improvements are not required before we restart any of the Savannah River reactors?

Mr. WADE. Senator Thurmond, both kinds of improvements are required. There are some technical improvements necessary to solve the issue of power levels. There are some mechanical improvements necessary, for example, to bring the plants into seismic compliance.

The incidents, during the restart of P reactor, were largely associated with human performance, nonadherence to procedures, poor judgment on the part of operators. Those perhaps are the most difficult for us to overcome.

But restart of the plants will require attention in all areas.

Senator THURMOND. Mr. Starostecki—and did I pronounce that correctly?

Mr. STAROSTECKI. Yes, sir.

Senator THURMOND. How would you summarize the actions that need to be taken before we restart any of the Savannah River reactors?

Mr. STAROSTECKI. The restart strategy I think needs to be explained a little bit. So let me state that the approach we are taking at Savannah River for the reactors is really a two-phased approach.

We needed to recognize that there are some issues that are longstanding, which will not be fixed this year or next year. As in any plant, there are a number of issues that need to be tracked, and we cannot fix all the problems at any one instant in time. In the commercial sector, they have something called living schedules. They are able to look at problems and reflect on them for a period of several years.

So, one of the things that is needed is an integrated long-term plan that says what are the issues, what do we need to do long-term.

As an example, take the situation with cracks in pipes. If you have an integrated long-term plan, part of it may reflect on the fact that maybe in 3 or 4 years we ought to replace some major pieces of pipes. If we have that in the plan, then out of that fall some short-term solutions. Maybe it is acceptable to do some temporary fixes in the interim.

So, the restart strategy said let's identify the safety issues, let's levelop the integrated long-term plan, and, from that, we will also dentify the restart requirements.

So, the restart requirements that we have identified to date were n attempt to identify a number of issues that had to be resolved vithout major radical changes to the organization and to the mangement.

I believe there has been with the delays that we have encounered a need to reflect that we do not yet have a long-term plan in lace, and that is needed before a restart decision is made.

There has not yet been made the transition. With the passage of ime, we need to be assured that the management in place, that tarts up the reactor, will be in place for continued reactor opertion.

So the restart criteria were intended to be benchmarks, yardticks by which we would measure our progress in making a retart decision. They are not to be viewed as individually magical tems that will require strict compliance and adherence.

In fact, roughly 75 percent of the restart criteria deal with issues uch as human performance and procedures and reflecting on imroved controls.

The remaining 25 percent of the items generally called for an asessment of what is the safety implication of doing something now ersus delaying it.

So, in the process of looking at restart, it is important to reflect hat we are not just dealing with some magical set of minimum reuirements. We are not. We have yet to generate and produce a ong-term plan and the implementation program for these items.

So, as a result, there is contention as to what these various issues re because we do not yet have all the facts on the table.

It is in this regard that we are looking toward Westinghouse ringing their commercial experience to the table, to help pull toether the necessary plans that will let this happen.

Mr. MOORE. Senator, may I add one comment, from a Westingouse standpoint, on the reference to the transition and the mangement? We have recently now become very involved in the retart with our Westinghouse people, who will then be responsible or reactor operations.

So, our individual, a very experienced individual, who will be in harge of reactors, is now managing the restart program. So, when ve go through the April 1 point, it is going to be a bumpless transer because those people are already essentially in the process.

Senator EXON. Are you saying, then, Mr. Moore, that when we estart, or if we restart the Savannah River facilities, it will be prinarily a decision dictated by you and your organization, based on vhat has been ongoing in the past.

Is that correct?

Mr. MOORE. That is correct, sir.

In fact, we, Westinghouse, have to satisfy ourselves that the esential things have occurred, in terms of training the people and vhatever modifications are necessary. Then, of course, we have to et the approval and acceptance of the DOE.

But we will be the initiators of that event.

Senator **Thurmond**. As I understand it, Westinghouse is now working with the Du Pont officials, but Du Pont is still responsible up until they actually turn it over to Westinghouse.

Mr. **Moore**. That's true. Our managers are what we call seconded into their organization. Still, it is Du Pont's responsibility. But it has been a very good working relationship as we have integrated in.

Senator **Thurmond**. Dr. Ahearne, how would you answer the same question I asked Mr. Starostecki?

Dr. **Ahearne**. Could you rephrase what that question was, please?

Senator **Thurmond**. You want me to rephrase that?

Dr. **Ahearne**. Yes.

Senator **Thurmond**. Okay.

How would you summarize the actions that need to be taken before we restart any of the Savannah River reactors?

Dr. **Ahearne**. I would say, just looking at it broadly, to establish what are the criteria that one will use to decide whether or not the reactors can be restarted. That's one way of saying what is the set of safety criteria that you will use.

A second is to be sure that one understands the condition of the reactors. That is part of what Troy Wade put on his list, that is, verifying what actually is there.

Then, the third is to have improved the training and the management control in the organizations that relate to the Savannah River facility.

Those I would say are sort of the broad issues that my committee struck in our letter.

Senator **Thurmond**. Thank you very much.

I think my time is up, Mr. Chairman.

Senator **Exon**. Thank you, Senator Thurmond.

We will continue to follow the early bird rule. I will recognize Senator Glenn, who will be next for questioning.

But we want to interrupt at this time to recognize the chairman of this committee, since we are in full committee, who may possibly have some comments on another matter that has been taking a lot of time of the committee.

I call upon Senator Nunn for anything that he has to say on that subject.

Chairman **Nunn**. Yesterday, when we adjourned the Tower hearings, I announced, after consultation with Senator Warner, that we would not have a vote before 11 o'clock today, but that we hoped to have a vote today and that there were odds and ends that had not been cleared up in the file.

The file is still not complete, and there are members now who have made a request to review certain items in the file. So we will not be voting today.

This is a joint decision between Senator Warner and me. We will not be voting today on the Tower nomination.

We will announce, as soon as we are able to, a definite date for the vote.

Senator **Warner**. The chairman and I also have been looking at some additional information that has come to the attention of the two of us and, therefore, the committee as a whole. We feel it important to see that each one of these bits of information are carefully checked out.

The Senator and I will be meeting with the FBI and others today.

Chairman NUNN. Mr. Chairman, thank you.

I will be back in this hearing as soon as I can return. This is an extremely important matter, and I will say to the witnesses, I will be following this. We appreciate your leadership, Mr. Chairman, in having this hearing.

Senator EXON. Chairman Nunn, Senator Warner, thank you for coming in. We are delighted to interrupt our hearing for that purpose.

I want to publicly salute again the excellent job that Senator Nunn and Senator Warner have been doing on the investigation and holding of hearings on the nomination by the President for the new Secretary of Defense.

Senator Glenn.

Senator GLENN. Thank you, Mr. Chairman.

Dr. Ahearne, you addressed this a little bit, but I was a little bit concerned about one of the sentences in your statement which just sort of popped off the page at me when I read it.

You said that we are uncertain as to whether all technical problems have been uncovered. You addressed that a bit, but I am very concerned about it. Are we working to uncover them? How are we working to uncover them and what is the status of that investigation?

Dr. AHEARNE. First, let me comment.

I always write as a physicist. When I say "We are uncertain," it means I am not certain; that is, I do not know that everything has been found.

Now, I will have to reflect that one of the situations we have now seen at most of these facilities is the closer we look, the more problems we find. By "we," I mean the Department, the contractors, the GAO, the Congress.

It is in this sense that, as I understand it, the DOE still has teams looking through what are the configurations in the plants.

We heard from Mr. Wade, for example, just a few minutes ago, that there is another investigative team looking at the events related to the water hammer.

Senator GLENN. Let me just interrupt you, if I might. You had another statement in your January 13 letter to Secretary Herrington.

I would ask that this whole letter be included in the record, Mr. Chairman.

Senator EXON. Without objection, it is so ordered.

[The information follows:]

ADVISORY COMMITTEE ON NUCLEAR FACILITY SAFETY,
U.S. DEPARTMENT OF ENERGY,
Washington, DC, January 13, 1989.

Hon. JOHN S. HERRINGTON,
U.S. Department of Energy,
Washington, DC.

DEAR MR. SECRETARY: As requested by Assistant Secretary Baynard, we have provided comments on several versions of the draft DOE Safety Policy, and on some proposed attachments. The latest version reviewed is that of (October 27, 1988).

which included one attachment, "(Safety Elements)". Our previous comments were considered by the Department and many are incorporated into this version.

The current draft includes several sound, broad policies. Whether this Safety Policy will be of help depends on two additional steps:

(1) Acceptance of the policy throughout the Department as guidelines for practice, and

(2) Prompt issuance of implementation guidelines which are promised.

At the present time, the package is incomplete without the supporting documents.

In a similar vein we would like to see these broad principles implemented as a guide, for example, in the Savannah River restart program. The restart program is an obvious candidate for application of the principles developed in the safety policy. Application to the restart program will demonstrate a commitment to the policy. However, in doing so, the Department must progress thoughtfully. Many steps must be taken and objectives met before any of the SRP reactors can be restarted. Yet there does not seem to be a coherent expression of the level of safety toward which all these actions are directed. It is therefore difficult, perhaps in principle impossible, to judge whether the actions are enough, or even too much. It is for this reason that the use of the policy as a guide might be helpful.

Although not necessarily applicable to the draft policy *per se*, a few additional comments illuminate our view as to how the policy should be implemented.

There appear to be several options in implementing the policies of the Department for the safe operation of reactors:

(1) Aim for a level of safety comparable to that achieved in the commercial reactors. One should obviously not try to duplicate the mass of regulations, guides, positions, and understandings that make up the commercial environment, but could still aim for a comparable level of safety. The problem would then be one of developing a practical strategy for measuring progress toward that end.

(2) Use the safety principles developed by the IAEA for commercial plants, recognizing that these are, while largely unexceptionable, a bit vague and discursive. Since they represent agreement among many nations, this is hardly surprising.

(3) Set quantitative standards, and enforce them through probabilistic risk assessment. The Nuclear Regulatory Commission (NRC) has devoted ten years to developing this approach. After many years of debate inside and outside of the Commission, the NRC has not completed the implementation of this approach. In view of the experience of the NRC, we recommend that the Department not use this approach as the sole approach, and certainly not as the near-term approach.

We believe that the most promising approach for the Department to use now is to aim at approximate parity with the commercial safety level, but without duplication of the vast set of rules. The current draft policy could be of substantial assistance in providing a framework for the near term and for developing the long-term safety policy. The best (perhaps the only) way to assure meeting this goal in the near-term is to depend heavily on the judgment and expertise of people who understand the commercial experience and its relevance to safety levels, in sufficient depth to bring that wisdom to the service of DOE. While necessarily subjective, this approach has the best chance of bringing closure of current safety issues in a reasonable time.

Attached are specific comments.

We hope our review will be of assistance.

Sincerely,

JOHN F. AHEARNE, *Chairman.*

ATTACHMENT 1

We believe the current draft attachment should be strengthened in its treatment of quality assurance. We recommend the following (additions are in italic):

3.0 Quality assurance

A comprehensive quality assurance program, *based on the requirements of ANSI/ASME NQA-1,* for the design, safety assessments, construction, testing, operation, maintenance, modification and *refueling* of nuclear facilities is to be provided, to ensure *the safety of the public and of the personnel, equipment and processes associated with these facilities.*

This *Quality Assurance* program is to be most intensive in application to facility components and systems having greatest importance for risks. It is to be structured in conformity with the principle that responsibility for achieving and verifying quality rests with those performing the task *with provision for independent verification such as by audit or assessment by appropriate organizational elements. A specific quality assurance program plan or description for each facility must be in place prior to implementation of activities affecting the quality of components and systems. This*

> *plan or description must provide for explicit practices and procedures for achieving and verifying quality in performing specific tasks.*

Senator **Glenn**. To quote from that letter, you said:

> Many steps must be taken and objectives met before any of the SRP reactors can be restarted. Yet, there does not seem to be a coherent expression of the level of safety toward which all of these actions are directed.

Now, that is an even more serious charge, that after all of the problems we have had, people are still not geared up and sensitized to the level of safety that is required.

Would you comment on that?

Dr. **Ahearne**. Yes.

I want to draw two distinctions there.

First, there are certainly many people in the Department, best represented by Mr. Starostecki, whose focus is on safety, and Rich and some of his people have really brought, to use a phrase moving around Washington, a "new breeze, a new wind," into the Department.

So I certainly would not want to imply that there are not people who have strong views on safety.

But the issue that my committee was trying to raise is the difficulty of establishing a set of safety criteria by which you measure are you meeting a performance.

The NRC has spent years struggling in trying to get that. They have a huge mass of regulations which, essentially, are geared to explaining what does the term "adequate protection of the public health and safety" mean.

As you know, in the discussions on the Nuclear Safety Board, there was a lot of discussion about what should the criteria be that that Board would be focused on.

My committee has raised the point that we are concerned that the Department has not yet concluded what ought to be that set of criteria.

Now, I will have to admit that it is probably compounded by the people who are most capable of doing that—people, again, like Starostecki—who are, these days, completely enmeshed in trying to work on the day-to-day problems. But, nevertheless, my committee's conclusion was that, when you look at any large-scale plan to restore the health of this facility, as well as all of the facilities, we believe that the Department has to establish some accepted, clearly understood, and then able to be implemented, set of safety criteria.

Senator **Glenn**. I wish we had more time to explore this. We may be able to do so a little later. I appreciate your comments on this, and I am sure Mr. Starostecki and Mr. Wade want to comment on this also.

But first, let me ask another question of Mr. Moore, before my time is up.

Mr. Moore, as I understand it from testimony before the Governmental Affairs Committee, you are moving in with 40 management people. We look at a new team coming in. It's going to be a new day. There's going to be a new emphasis, new procedures, new everything, and it's going to solve our problems for us—we hope.

Now, that is optimistic.

The facts are that you have about 11,000 employees, and the facts are the management team is about 40 people.

Now, there is a mindset of these people who have made careers working in the industry generally, and in the Savannah River plant, in particular, the reactors at Savannah River, P, K, and L. It is a big order to change how they operate.

You said on page 5 of your testimony, I believe, that it is going to require time to respond fully and responsibly. I am sure that is correct.

Are the people working in those plants safe right now, today? That's number one.

Number two, how are 40 people out of 11,000 going to change the operations and the sensitivity to safety matters that have been ingrained there for 35 or 40 years?

Mr. **Moore**. That's a good question, Senator. It probably sounds kind of presumptuous that a few of us—and it may be more than 40; we may probably, as we see things unfold there, be 100 or 150.

Senator **Glenn**. The ratio of 100 to 11,000 still is a pretty thin ratio.

Mr. **Moore**. Yes, it still is a small number compared to the 11,000.

But I think I need to put a little bit of that into perspective.

First of all, with respect to the people there, there are good people there, Senator. The qualifications, the experience, the credentials of the people on the site are very impressive. The kinds of people that they hire, particularly in the technical areas, out of the colleges and universities, are at the very high levels of their class standing.

So they have good people.

We have found that they do want to do a good job. The work ethic is good.

What has been of concern and a problem down there, in our view, is how it is organized and managed. I mentioned earlier—and it's not a trivial issue—the way that Du Pont attempted to manage that site, with three different lines of responsibility reporting up to Wilmington. So, there were three separate entities on that site: the laboratory, the operations, and the construction.

This is a very complicated management process.

What we are going to be able to do, we believe, is put in a management system and a process to help those people do a good job.

Culturally, we have some things to overcome. They have an absolute obsession with safety, particularly in the industrial environment. I mean, it is unbelievable how they behave from a safety standpoint, industrial safety. I have not seen anything like it in my whole career, in terms of their attitude and the importance they place on that.

But we need to bring in some of the commercial nuclear practices to help them on the reactor side. We believe we can do that.

It is an interesting statistic that I just heard: it is estimated that, by the end of fiscal year 1989, the staff down there will be such that about 50 percent of that staff will have been there for less than 5 years.

So we do not have an entrenched 30-year culture with a massive, large group of people to deal with, either. I think that is going to help us, too.

Really, the issue is to get in there and organize the management process with accountability and discipline to help them through this. Now it is a pretty disorganized, almost "Keystone Cops" kind of thing. The next issue in, we all have to wrestle with that. We are going to try to discipline that.

Senator EXON. Thank you, Senator Glenn.

Senator Cohen.

Dr. AHEARNE. Senator, may I comment on that?

Senator EXON. Yes, Dr. Ahearne. Go ahead.

Dr. AHEARNE. Without in any way meaning to imply that I don't think the people from Westinghouse are very good—and, certainly, from what I have seen, they are—I am concerned about Senator Glenn's question.

Even if they have a large amount of people who have only been there for 5 years, they have been for 5 years in a different environment. I think it will be very difficult to quickly make the level of changes, as you have said, that are necessary. As others have said, I think, in a different context—and I may be quoting Rich, I'm not sure—you have to implant a new safety culture, and that takes time.

Senator EXON. Thank you, Dr. Ahearne.

Senator Cohen.

Senator COHEN. Thank you, Mr. Chairman.

Mr. Moore, Senator Glenn indicated that one of your statements sort of jumped off the page at him, and I must say that I had a similar reaction. On page 5, you state that "Savannah River has an excellent record of safety."

I think that is a rather startling statement to make in light of some of the revelations that we have learned about.

Are you suggesting, for example, that the attitudes and the actions taken by Savannah River's operators have reflected an adequate appreciation for safety?

Mr. MOORE. Let me put that in context, sir.

I think the bottom line results do indicate that we have not had any serious accidents down there.

Senator COHEN. Is your definition of safety, then, the absence of a major catastrophe?

Mr. MOORE. No, sir. Please let me continue.

Just look at the bottom line. I think the results, particularly in terms of the health physics, the exposures of people, and so forth, have been very good.

What has been missing there is an understanding of reactor operations and particularly, from what we have learned and Mr. Starostecki has indicated in the commercial world, over the years the attention you have to pay to the people to really understand what they are dealing with. That is missing. That is clearly missing.

If you put in the context of the separations operations, the chemical side of the house, I think we have had the National Academy of Science down there and others review that. They get good grades for those kinds of operations. Those are operations that Du Pont is very familiar with—chemical processes and so forth.

It is the reactor side that we need to focus on, and we are, of course.

Senator COHEN. The Department of Energy's Inspector General is currently investigating why Du Pont withheld for some 7 months a memo on the reactor cooling system cracks, that Secretary Herrington indicated contained important new information critical to operational safety.

Would that failure to notify DOE of this information be appropriate behavior, from a safety perspective?

Mr. MOORE. No, sir. Our view, as we are going through this transition process, is it a large site, it is a very complex operation, and they have not really had a good process or procedure to make those kinds of notifications.

So I think it is more the system, rather than the intent of the people. But we really have to organize that so that both with DOE and ourselves, I will get notified immediately, as will we notify the DOE.

We have to institute that process.

Senator COHEN. Dr. Ahearne, you testified last week that DOE safety officials were "very, very skeptical" about a so-called "leak before break" standard that has been proposed by Du Pont.

Are you in opposition to adopting such a standard? It seems to me that that is a lowering of the safety standard, rather than an enhancement of it.

Dr. AHEARNE. When I said that DOE officials were skeptical, I was referring to people representing the gentleman on my right. So I will pass in a minute to him and let him explain what the skepticism is.

My committee had looked at the question of leak before break. That is the issue you are addressing.

Senator COHEN. Right.

Dr. AHEARNE. It is not something that Du Pont suddenly came up with. It is a phenomenon that has been examined for many years in the commercial world, to see whether or not it can be proven out.

I would not characterize it as a weakening of the safety standard if it can be proven and shown experimentally and analytically that one can have high confidence that a leak before break philosophy would work.

The skepticism is whether that can be done.

At the moment, the same level of analysis and experiment is also lacking with respect to the current design basis accident.

Where my committee has come out is we have looked at what is available. We do not believe that what is available is enough to give you the kind of confidence that you would require in the commercial world for verifying operations.

We are looking at these proposals, both the experiments and the analyses being done, to demonstrate living with the current standard and also leak before break.

Senator COHEN. There are two points that I want to make.

First of all, there is a difference between commercial reactors and this type of reactor. You have containment buildings in the commercial facilities which you do not have here. So, a leak before break standard would be somewhat quite different, I would submit, in that environment.

Second, the New York Times reported on January 16 that there is an internal memo that indicated that there are serious problems with cracks in the cooling system pipes at Savannah and that they may have been installed back in, I think, the early 1950s. So, before we give serious consideration to a leak before break standard, it seems to me that we have to take that into account.

The final point, since we only have a 5-minute opportunity to question you, is this.

On safety oversight boards, Congress established the Defense Nuclear Facility Safety Board. Senator Glenn was one of the leaders in initiating this legislation. Secretary of Energy Herrington composed his own committee, and he appointed you and others to serve on that.

Mr. Moore, you just testified, I think on page 8 of your testimony, that there is another nuclear safety environmental oversight committee that you have initiated.

I find it somewhat ironic, in view of your stress on new management, single lines of communication and well-defined interface, that now we have three oversight committees: One Dr. Ahearne is sort of chairing, one you have recommended and one the Congress has created.

The President, by the way, has yet to appoint the members of that particular board.

The question I have is this. Number one, who is going to sit on your committee? Who are the members? What is the mandate? Who does it report to? Does it report to Westinghouse, the Department of Energy? Exactly why, and what is this committee going to consist of?

Mr. MOORE. Let me clarify. I have set up an organization, when we take over April 1, called Environmental Safety and Health and QA. It is a division of my operation.

So it is my people making sure that we interpret and implement the safety criteria and principles from DOE for our operation.

They will set the standards, the requirements. They will be my oversight activity from an ongoing operational standpoint.

So, it is really my arms, legs, eyes and ears to see that we are doing the right thing at the site. That is one organization.

Senator COHEN. What is the relationship between you and Dr. Ahearne?

Mr. MOORE. For Dr. Ahearne, I would come to his committee to defend and support what we are doing in the safety arena——

Senator COHEN. Based on your oversight committee's activities?

Mr. MOORE [continuing]. Based on my own activities; that's right.

There is one other committee that I did want to mention, which was referenced, I believe, in testimony.

From a Westinghouse standpoint, we have an independent safety committee of our own, which reports to my boss, Ted Stern. It is an independent committee which is chaired by Dr. Warren Witzig, who is well known in the industry and from Penn State.

This is a committee made up of some outside people and some Westinghouse people, who will review my operation as well as all of the other DOE managed facilities, facilities which Westinghouse manages, just to ensure, from a corporate standpoint, that we are doing the right thing.

Senator **Cohen**. Once this new Defense Nuclear Facility Safety Board is composed, does Dr. Ahearne's go out of existence? What is the situation at that point?

Mr. **Moore**. You'd have to talk to DOE about that.

Dr. **Ahearne**. If I may respond, first, my committee is not oversight. We're an advisory group to the Secretary. So we do not try to put inspectors in place and review everything that is happening, unlike the Nuclear Safety Board which was established.

Second, if there is a comparison, the Nuclear Safety Board is like the Nuclear Regulatory Commission, and we are like the Advisory Committee on Reactor Safeguards. We are a part-time group, mostly experts, who provide advice on some issues.

So, I think, as I mentioned earlier in my testimony, the real issue is what is the relationship between the Nuclear Safety Board and Rich Starostecki's side of DOE.

Senator **Cohen**. I'm just trying to keep all the squares in line.

Dr. **Ahearne**. It's hard to do.

RELATIONSHIPS AMONG SAFETY COMMITTEES

Senator **Cohen**. Mr. Moore has an advisory committee; you are an advisory committee to the Department. We have an advisory and oversight committee that has been created by Congress. I'm just trying to figure out who's on first and where these lines of communication are going to run.

I believe my time has expired.

Mr. **Wade**. Mr. Chairman, may I add to that?

Senator **Exon**. Please do so, Mr. Wade.

Mr. **Wade**. Senator Cohen, the new Secretary-Designate has not yet, I think, decided how he intends to proceed with safety reviews and safety oversight. He uses the distinction Dr. Ahearne just used. Dr. Ahearne's committee is more like an advisory committee on reactor safeguards. The law requires that the President submit nominations to this committee by the end of March, on the other board. I think it will take a little time for Mr. Watkins to sort out what is going to be the relationship.

That is an important point because, with all of these boards, including those described by Mr. Moore, we could end up with traffic problems at Savannah River.

Senator **Cohen**. Mr. Chairman, I just want to indicate that I think it is more than simply a management problem. I think we have been skating on thin ice for quite a while.

A great deal has to do with money, that we have not provided the money necessary to take the safety precautions and measures that are necessary. Frankly, I do not see much in the way of future prospects for infusing money. Although that is not the only answer, it is going to require a great deal of money in the future to correct this problem. It has been ignored over the years.

So it is not only a management problem. I would suggest that it has been a money problem, and we have compromised on safety because of that lack of devoting sufficient funding to it.

Senator Exon. Thank you, Senator Cohen.

Senator Wallop.

COMPLIANCE STANDARDS

Senator Wallop. Thank you, Mr. Chairman.

I would like to travel down the same road as Senator Cohen.

I read with appreciation your warning on the bottom of your second page about the two safety groups having both a staff of 100, approximately, both resident inspectors, both will be establishing overall safety policy. Your statement is that unless some careful thought is given to how these two relate, they may become adversaries, delay improvements, and cause imprudent use of resources.

Then I heard Mr. Starostecki talk about the long-term plan and what does the long-term plan contain, and the statement that not all the facts are on the table.

I guess my question comes down to this, and I will ask perhaps Mr. Wade, Mr. Starostecki and Dr. Ahearne to respond.

Are we in danger of establishing a standard beyond compliance? If these groups are not managed and fall into competition, one with the other, will you be able to unravel a standard that the operator, Mr. Moore, can accept as his responsibility?

Mr. Starostecki. I think you have to reflect on the fact that yes, first of all let me deal with some of the hardware issues you raised.

There are technical deficiencies in the plants, and they need to be addressed. It is going to take money.

We have seen it in commercial plants that are 25 and 30 years old as well. You don't fix those problems overnight, and that is why you need to budget for them, you need to lay out a schedule, and you need to be monitoring yourself to see if you satisfy that schedule.

When we talk about seismic upgrades at Savannah River, that is what we are talking about. There are electrical systems, control systems, that need to be upgraded.

We can't do it all this year.

Are there acceptable compensatory measures that we can take in the interim? The answer is, generally, yes. This is where we have a lot of discussion within the Department and with the contractors, as to the adequacy of those compensatory measures.

The experience in the commercial sector says we need to have line management be very clear as to what they consider acceptable safety performance. We are not striving just to meet a minimum set of requirements.

I think we would be lulling ourselves into a false sense of security if we started establishing a detailed set of prescriptive requirements to assure operational safety.

What has happened, I think, during the evolution of the commercial sector is a recognition that design and construction of complex hazardous facilities, like nuclear power plants, requires national consensus standards, mechanical engineering codes, construction codes.

Once the plant goes into operation, you just cannot take an attitude of meeting minimum requirements. There are so many phenomena and uncertainties that do arise with a complex machine that we need to be training our people to cope with these problems.

So, striving for excellence is, in fact, a true objective. The difficulty comes of who should be setting those standards of excellence.

Senator **Wallop**. In fact, I think that is my question. Somewhere along the line, somebody has to be able to accept responsibility under a set of standards that have found general agreement.

Mr. **Starostecki**. I think what we find is that you need oversight regulatory bodies to set the minimum threshold.

The commercial sector clearly has demonstrated that they, the owner-operators, need to have enough dialogue to establish standards of excellence.

When you look at training in the commercial sector, there is no NRC regulation that says this is how you train people. They want performance. But it is the utilities themselves that, through the INFO process, developed an accreditation program.

Similarly, when you look at the Department of Energy, there are good models in the Department of Energy where contractors have established what I refer to as a contractor self-improvement program. They visit sites. They establish better procedures. They take the best practices that they find, and that is what they use to measure and judge themselves.

From an oversight standpoint, I am encouraged because they are providing more margin above and beyond minimum. And they are imposing upon themselves a higher standard of performance.

So, when Mr. Moore talks about review committees, it is committees that will open the dialogue with the rest of the community. And, when we look historically at Savannah River, because of the nature of the problem, they have been somewhat insulated not only from the complex, but from the commercial sector.

It is not our intent to blame anybody. I think we need to have good, knowledgeable people, who are willing to do this see an alternative approach and see that the yardstick that we are using to measure them against has gotten tougher.

Senator **Wallop**. Mr. Chairman, I would note that my time has expired.

Let me just express my frustration that the question I asked I don't think was answered.

Sir, I don't think that is your fault. I think it is probably my phrasing. But it goes to the heart of what I am trying to get at. If you have two groups, competitive groups, as Dr. Ahearne warned us of, establishing safety standards, the question really is are we in danger of establishing a standard that is either beyond compliance or beyond comprehension, and that doesn't go to the issue of minimal compliance, because I agree with you that the standard ought to be of excellence. But, if you can't get a decisionmaking started from a basic set of criteria, how are you even going to get to the standpoint of standards of excellence?

My worry is that perhaps we need to establish a leader amongst these competing groups and give dominance to one or the other, so that some kind of standard can govern.

Dr. **Ahearne**. That was one of the issues I was alluding to.

I think it has been very difficult for one group to set up the standard. When you have two groups trying to do the same thing, there is the potential for more confusion being implanted.

Senator WALLOP. Thank you.

Senator EXON. Thank you, Senator.

Senator Gorton.

SAFETY CRITERIA

Senator GORTON. Thank you, Mr. Chairman.

I operate under the disability of not having heard most of the earlier testimony. But perhaps the question I want to start with is a direct followup to what Senator Wallop asked.

I understand that Dr. Ahearne earlier stressed the need to establish clear safety criteria and criticized the DOE for not having done so.

If I am accurate in that assumption, I would like Mr. Starostecki to respond to whether or not he thinks those two factual propositions are correct and what ought to take place in order to set clear safety criteria.

Mr. STAROSTECKI. It is a valid criticism that we have been tardy in developing our safety criteria.

We have, in fact, been working over the last 9 months to develop a revised safety policy with accompanying criteria. We have consciously recognized that we ought to be adopting some of the lessons learned from international experience.

So, in fact, we have gone to the International Atomic Energy Agency and they have developed safety principles. We have drafted guides and policies that reflect an improved way of doing business.

We are within literally months of sharing that and getting further comment on it. I would hope that, with the new administration, we would be in a position to propose to Secretary Watkins, when he is confirmed, a revised policy with all of the instructions to the Department of how such a policy should be implemented.

It is critical that we have those criteria because the new production reactor needs to have the criteria by which we will judge its adequacy.

It is essential for that purpose, and we recognize the urgency. We just do not want to make the rash assumption that what has been done in the commercial sector over the last 30 years is good enough for what we want to do in the next 40.

So, it is a difficult chore. We have made progress, and I think there are valid criticisms as to the amount of time it is taking.

But, I think, in light of the implications these will have, that we do need to do it right.

Senator GORTON. Dr. Ahearne, is that a satisfactory response?

Dr. AHEARNE. Well, actually, Senator, it is not to me that he has to provide the response.

We made a point that something was missing. He said yes, it is missing.

We have participated in commenting on several of these drafts.

There are a number of issues with respect to what is in the safety policy. But I think my committee has concluded that, without that on the table, without some of those criteria explicitly spelled out, you cannot test against anything in, for example, a restart strategy or, as Mr. Starostecki pointed out, the criteria for the new reactor.

So, progress is important. Actually having it signed out by the new Secretary will be the satisfactory answer.

Senator **GORTON**. On another subject for you, Dr. Ahearne, do you think that with its plan of 40 new people, 40 new supervisors, the new contractor will be able to make a timely difference in the operations of Savannah River?

Dr. **AHEARNE**. Well, "timely" is the key word there. It is another way of saying how long will it take to make a significant difference with the 40 people.

We had discussed that earlier before you arrived.

I think Mr. Moore is committed to the belief that, even with the high quality people he is bringing in, as he mentioned, it may have to go up to 100 to 150.

My concern, my committee's concern, is that we saw so much of a culture in the nuclear safety area at Savannah River that has to be changed that it is not obvious to me how long it is going to take if you just have a few people, and 40 is few, at the top, to make that change.

I am concerned about that. I suppose I should let Mr. Moore comment on that.

Mr. **MOORE**. Thank you.

I think it is important to point out that we are interested in the overall side, of course, from operations, from safety and environmental operations. But we are focusing on the reactor side. I think there are only a couple of thousand people that are involved in that particular area, in operations.

So, it is still a big ratio. But I think we must put it into perspective.

Now I do not minimize the task in front of us, believe me. But I think, with the people leading by example and putting the systems into place in the process, we can get there. I think we can get there in a timely way.

Senator **GORTON**. Thank you, Mr. Chairman.

Senator **EXON**. Senator Gorton, thank you very much.

If you are prepared to start asking questions right now, you would be up next, Senator Lott.

Senator **LOTT**. I will yield at this time since I just arrived, Mr. Chairman. But thank you very much.

Senator **EXON**. Thank you.

It is a quarter of 12. I would like to advise the witnesses that we are going to begin our second round now. There undoubtedly will not be time for all of the questions that we wish to pose to you. I would just say at this time that I, and others as well, will have some additional questions that we would like to have as part of the record, which we would submit to you. We would ask that you respond as quickly as you can to these, so that we can incorporate them in the record.

This room is rather small. It is warmer than usual in here this morning because of the television lights. This is a room where the members of the Armed Services Committee toil and spend, I suspect, half of their Senate lives. But generally these proceedings are closed. Generally, we do not have the heat of the lights.

I apologize for any discomfort on the part of the witnesses. We have people, for the first time in my memory, standing in line out in the hall to get into this room. We have few hearings that bring this much attention from the press that are at least open.

I have just asked that anybody who is waiting, to be allowed to stand in the back of the room because we think this is tremendously important and the public certainly does have a right to know.

Let me begin my second round of questions with a question of you, Dr. Ahearne. If anyone else would like to comment on it, please do so.

As I understand it, Dr. Ahearne, in your committee's review of the plan for restarting the Savannah River facility, you recommended that "the Department focus all available resources on starting the first reactor with subsequent action on the other two."

I take it this is, in part, due to the limited funds, but also because you found that "competent people are in even shorter supply."

NEW PRODUCTION REACTOR

In view of that, Dr. Ahearne, do you believe that the same general approach of concentration, rather than diffusing, scarce resources is needed in DOE's new production reactor program? Or do you believe that we can go along with what DOE has recommended, and that is to develop and design and build on a concurrent schedule two new reactors of different types at different locations?

Mr. Starostecki, I would like to have at least you make a comment on that after Dr. Ahearne has answered this question.

I think that basically this comes down to what I think you have recognized is a concern of this committee, as to whether or not, No. 1, we have pledged the resources—and I am convinced that we have not—and, No. 2, do we have the personnel and will we have the personnel, even at Savannah River, when Mr. Moore and Westinghouse take over?

I think I can best express this by saying that we are concerned there is being too little done too late on a major problem that confronts America, not only cleaning up the nuclear waste at our defense facility, but also the critical construction of facilities and new facilities for tritium production.

Dr. AHEARNE. Senator, fortunately, my committee is a safety committee. So, as I mentioned earlier in my comments, we do not address budget questions and, clearly, we stay out of the political arena, in which there are some embedded issues, as you know, in the question you asked.

However, we do have a subcommittee on the new production reactor, and it has had a couple of review sessions.

Some members of that subcommittee have raised a concern about the ability of the Department to pull together enough effort, focused effort, knowledgeable effort, to develop the ideas and the concepts for two new designs at the same time.

So that is a concern that has been already raised.

Since the Department, at least to my knowledge, has not yet built up the teams or started the effort in any great detail, it is hard for me to say whether or not that possible problem is actually a real problem.

We had seen a problem in looking last fall at the efforts at Savannah River. It looked to us as though there was not that complete focus upon one reactor.

Mr. **Starostecki**. Senator Exon, I can answer the question from the standpoint of safety oversight and safety review, recognizing that the new production reactor is very important to this country and that it requires the best technical skills we can apply to it in terms of doing a safety review. The technologies both involve something other than what has been used in the commercial sector—a gas cooled reactor and heavy water reactor.

When you look at the Department, we, quite frankly, do not have the technical expertise to do the thorough type of safety review one needs to do. In fact, some of us are encouraging greater reliance on what I consider some of our centers of excellence, which we do have in our national laboratories.

We do need to integrate more quickly the reviews that the national laboratories would do for the Department in assessing safety.

This does, however, point out the deficiency in the Federal Government being able to attract technically-oriented people, who can monitor and direct the design and construction of these kinds of facilities.

We need, I think, to take lessons learned from Savannah River and other construction projects and look at what kind of programs have been successful. It does require a strong technical body within the Department to give it leadership.

Obviously, two reactors put a greater demand on that. The policy decision as to one or two reactors clearly is not for me to address. But from a safety review standpoint, I do see that there is an issue there and that we do need to address it. And, at the present time, we are working toward closer ties with the national laboratories.

Mr. **Moore**. Mr. Chairman, from a contractor's standpoint, I would like to add, just speaking for Savannah River, we recognize the extreme importance of the new production reactor to our country's defense.

We have, in fact, already appointed a very senior individual, reporting to me, as vice president of the new production reactor project.

We are prepared to take the appropriate scope in managing that project down at Savannah River. I think you will find that, among Westinghouse and the other suppliers and the commercial environment in this country, there are a lot of very good resources that can be available. Bechtel is our partner at Savannah River, our prime subcontractor. They have considerable experience and resources. So we believe that the job can be done.

Senator **Exon**. I recognize that you are concerned about safety, as we all are. We have a dual responsibility up here, not only in safety, but production of tritium, and we are going to get into that this afternoon a little bit more.

LINEAR ACCELERATOR

Let me ask this general question, and I would like to have any of you comment who have any expertise on it.

From the standpoint of safety, and if it were only a safety standpoint, what is your opinion of the potential of the linear accelerator, that I have been reading about? It supposedly could be built more quickly and maybe more cheaply than other types of reactors to make tritium. Safety-wise, do we have similar problems with the linear accelerator as we do in the other processes, as far as you know?

Dr. AHEARNE. My experience with accelerators is more with the physics community. This is, from what I have read, a significant upgrade of any existing accelerator.

But, from the safety standpoint, an accelerator's problems are just a magnitude less than a reactor's problems—on the safety issue.

My experience, also, coming from many years of analyzing large system development, primarily in the DOD, leads me to be very cautious about cost and time forecasts made by advocates of a new system.

Senator EXON. That is a good adage. It is more than an adage. It is a proverb.

Does anybody else have a comment?

Mr. Wade.

Mr. WADE. Mr. Chairman, I agree with Dr. Ahearne. Looking at it from a management point of view—and I will emphasize this again tomorrow—while an accelerator may provide an order of magnitude more safety than a fission machine, it is at the same time not nearly as mature a technology as a fission reactor, and it is very clear that, at the moment, we do not, as a Department, consider an accelerator to be a substitute for a fission reactor.

Senator EXON. It is not a viable alternative, then, in your point of view. Is that right?

Mr. WADE. Not at this time.

Senator EXON. Thank you, gentlemen.

Senator Gorton, you would be next.

Senator GORTON. I have no more questions.

Thank you.

Senator EXON. Senator Glenn.

Senator GLENN. I would like to recount a little of the chronology of this whole thing, how we got to where we are, and to find out what your views are on this.

DOE contracts with a contractor to run these facilities. It has been Du Pont, down at Savannah River. I think the attitude through the years—and perhaps all of us should have been smart enough to see beyond this—they are pretty good people, they have wonderful industrial safety, as Mr. Moore mentioned, and they are fully capable, and they can run these facilities with no problem. So we sort of turned the sites over to them.

While we set the very general guidelines and ground rules from Washington and DOE, that was the way it operated. We trusted them to do the right thing.

We now know that the whole nuclear complex, operating under a veil of secrecy, was geared to production and that was it—produce, produce, the Russians are coming, the Russians are coming, and if you have some waste material, you just put it in that pit out there; who cares, we'll deal with that thing later, the Russians are coming, so get that plutonium out here.

That was the mentality.

So there was not the hands-on oversight from headquarters or from DOE that perhaps we normally would have expected.

Now, we began to get concerned about this. We took action. There was my Defense Nuclear Safety Board legislation and this committee's work. Jim, you and I worked on this last year. We worked together on it, to establish an outside board because it appeared that we needed a second doctor's opinion. The safety board has now been enacted.

Secretary Herrington formed the advisory board. Dr. Ahearne took that on, and I hope he reconsiders his statement of a while ago. I would like to see him be the head of the safety board and be appointed to run. it. He has done an admirable job, and I don't have time enough to give all the accolades that he deserves.

But the reason that we had to do that was because there was not the kind of hands-on oversight that was necessary.

Now, I'm not saying there aren't good people at DOE headquarters. There are very fine and competent people. But we did not have that kind of oversight. That was the problem.

So we formed a second opinion. And you have done a good job.

Meanwhile, the Department has been sensitized, I think, more to this, and really is looking into it. We are fighting for a budget. We are trying to work together with you.

We have a new contractor coming in now. He is going to have a monstrous job with 40 people trying to change the direction of what could have been the Titanic, to avoid some problems. He has a monstrous job.

With all due respect to Westinghouse—I love them, I think they're great and have very competent people—let's not repeat the sins of the past and say okay, Westinghouse, you've got it, you're the people down there now and we trust you because you have a lot of nuclear experience. That will get us right back into the same old trap again.

DOE OVERSIGHT OF FACILITIES

So my question, Mr. Wade, and Mr. Starostecki, is what is planned from headquarters as far as hands-on oversight, hands-on DOE oversight. I know that you have made some moves in this direction, with the numbers of safety people onsite. But what are you going to do now to make sure that we keep control of these facilities whoever the contractor is? Maybe 10 years from now we will be shifting from Westinghouse to somebody else. Who knows?

It seems to me that there has to be hands-on oversight of these facilities in addition to Dr. Ahearne's oversight group. It is so important. We need these different levels of check to make sure that we have the safest complex possible.

That is more of a statement than a question, I guess, but you get the thrust of what I am after.

What are we going to do to make sure that we have hands-on oversight so that we don't get into the same unsafe condition we have seen in the past?

Mr. **Starostecki**. I would like to answer that, Senator Glenn.

The historical performance of relying on paper reviews does not work. We need to get people into the plants, walking around, kicking the tires, talking to the operators.

From an oversight standpoint, our role is a safety advocate. We are a catalyst to get line management to try to find their own problems.

Well, it has been discouraging to me over the last year. I have had three resident engineers at Savannah River identifying problems, and I think that demonstrates that DOE presence in the facilities is effective in identifying problems and getting solutions.

So we continue to look toward maybe staffing six or eight engineers from an oversight standpoint to be the prod, to be the catalyst. But that is not the solution.

It is not acceptable for the oversight parties to be identifying the problems. We need line management to have a direct involvement and recognize that it is their responsibility to find the problems.

So, from a DOE standpoint, we have, in fact, supported the operations manager at Savannah River in creating a dedicated organization for them to focus on the reactors and increase their staffing and try to recruit qualified people who can actually monitor contractor performance.

Similarly, having Westinghouse have Mr. Moore as the President of the subsidiary on-site is important. We are going to have problems during the transition because the current contractor has engineering resources in Wilmington. They are not on-site.

We are going to be encountering problems of trying to reconstruct the engineering records at that site, and we are going to have to be there to look at what is the actual condition of the plant, what are the safety analyses showing, and making judgments of what are the appropriate interim compensatory measures.

So, the focus is going to be continued vigilance on the part of the ES&H, the Environment, Safety, and Health organization, through the resident inspector program, complemented by more team inspections.

We are going to have to look at the reprocessing plants. We have not had a hard look at those.

We are going to be looking at the tank farms. We are not backing off. The staff, from an oversight standpoint, has gotten direction: go find problems.

When problems are identified by the contractor and the DOE line organization, we start to get encouragement that the system is starting to work. There are people in the Du Pont organization, there are people in the operations office, who are starting to manage and are starting to bring problems, and are getting the issues on the table.

We are starting to turn the system around, and we can work, but we have to maintain our vigilance.

Mr. **Wade**. Senator Glenn, may I make a quick comment?

Senator GLENN. Sure. Go ahead.

Mr. WADE. You are familiar, more familiar than most, with the GOCO contracting setup that we have used in the Department for all these many years. I think, by and large, the Nation has been served well by it.

But I would point out two things. One is that I think we have, in fact, not kept up with our contractors in terms of technical competence of the Federal staff. I think a fact of life is that we always will have to rely very heavily on the technical competence of the contractors.

We are moving to strengthen the Federal staffs all around the system, at Fernald, at Savannah River.

I would also like to point out, however, as you know, the contract at Savannah River is different than most. It is one of the two remaining contracts that go all the way back to the Manhattan Engineer District. In fact, at that time, Du Pont was asked to come in and run the plant. Some would argue that that philosophy has continued for 40 years.

That will not be the case when Westinghouse takes over. That is not the case at Fernald.

We have management tools available to us at other places that we do not currently now have at Savannah River. We recognize the deficiencies.

Dr. AHEARNE. May I make a comment?

Senator EXON. Dr. Ahearne, you may, and you may go on as long as you want. I am trying to bring this to a close.

But you go right ahead.

Dr. AHEARNE. Thank you.

I am a professional skeptic. As Yogi Berra once said, "This is déjà vu all over again." [Laughter.]

I reflect back after Three Mile Island, in which the industry and the regulatory community really woke up and got aggressive and there were a lot of very good words said. And a lot of very good words happened.

But, about 7 years later, there was a plant in which the operators were sleeping, and that plant was shut down for about 2 years before it was allowed to restart.

There is another plant up in Massachusetts in which the problems kept persisting for so long that it had to be shut down for about 2 years.

So, yes, I think there are a lot of people with the right attitudes, but it is still going to take a long time and it is hard work to change all of the culture that has already been growing up for so many years.

Senator EXON. Thank you very much.

Thank you, Senator Glenn.

Senator Gore.

Senator GORE. Thank you, Mr. Chairman. I apologize for being late to these hearings, and if I touch on areas that have been mentioned, please help me save time by referring me to the record.

I do apologize.

I want you to know that, along with my colleagues, I am vitally interested in how we are going to address these problems.

First of all, have we established the timeframe, the date, as of when you believe we are going to be ready to go back into operations, making tritium at Savannah River? Have we established that date?

Mr. **Wade**. We have not established a firm date yet, Senator Gore.

We have said that in March, at the culmination of several reviews, and several reviews of those reviews, we hope to have a firm date.

Senator **Gore**. So you don't know now when that would be possible?

Mr. **Wade**. It is our goal to resume operation this calendar year at Savannah River, but we do not yet have a firm date.

Senator **Gore**. What is your range of estimates? What is the earliest and what is the latest?

Mr. **Wade**. Well, it is clearly at best in the latter part of this calendar year. To the best of our knowledge, we cannot get any closer right now. I would say October.

Senator **Gore**. That's the best?

Mr. **Wade**. Probably the best. Yes, sir.

Senator **Gore**. What's the most likely?

Mr. **Wade**. I am called the eternal optimist, Senator Gore. Perhaps Mr. Starostecki ought to answer that question.

Clearly, if we uncover additional problems, if we are not satisfied with the human performance kinds of things that we have talked about this morning, that will slip.

Senator **Gore**. What's the most likely?

Mr. **Wade**. Rich, do you want to answer that?

Mr. **Starostecki**. My responsibility is oversight, so I am trying to address the question of what do I see as for what needs to be done. What needs to be done is some management. Specifically, Westinghouse needs to get in there and assign some resources to find out, one, what is the condition of the plant, two, what needs to be done to upgrade that condition over the long haul, and, three, allocate the resources on-site.

We have focused on the restart of one reactor. Progress to date, since August, when we had the anomaly with the reactor startup, is not encouraging.

If I use that experience, the answer I have would be unacceptable to anybody.

So, we have to wait and see how the transition goes April 1 and what kind of information is developed by the new management team.

I really am not in a position to give you a real estimate because too much depends on how the situation is managed. We generally have the yardsticks, the benchmarks that we expect to see achieved in terms of technical fixes and training. But it really is dependent upon how many people are assigned the tasks and how serious the managers are in giving the right direction to the workers who have to make it happen.

Senator **Gore**. Well, it sounds like it is not likely to be this year, at a minimum.

Would that be a fair conclusion?

Mr. Starostecki. I am a skeptic. From a skeptic's point of view, a lot of things would have to happen very quickly, and they are not happening.

Senator Gore. So you would say it is not likely to be this year?

Mr. Starostecki. Based on the performance to date, that's true.

Senator Gore. All right.

It it likely next year?

Mr. Starostecki. I think it is difficult and I think it is dangerous to project that far ahead. I know that problems will be identified during the course of this year.

Senator Gore. Is it likely to come before January of 1991?

Mr. Starostecki. I would not want to make that kind of projection now.

Senator Gore. You don't think that is likely?

Mr. Starostecki. I really just——

Senator Gore. You just don't want to answer. All right. I get it.

Mr. Starostecki. I can't answer you.

COST OF FIXING SAVANNAH RIVER

Senator Gore. Now, you estimate the fix to be $250 million, is that correct?

Mr. Starostecki. There is a range of costs that people have made.

One can make some gross estimates of what kind of modifications need to be made. Those refinements are being made as we speak, and they estimate by March 1 that we will have a better figure.

Senator Gore. Is it likely to be more than $250 million?

Mr. Starostecki. As we look into the problems being uncovered, I think most likely, in my judgment at this time, the answer is yes.

Senator Gore. Now, is it true that OMB is telling you that whatever the cost is, the money will have to magically appear from that are already budgeted for other things at DOE? Is that the position OMB has taken?

Mr. Wade. We did request, as part of the 1990 budget, when it went to OMB, Senator, some additional 1989 funds for Savannah River upgrades. Those were not approved by OMB, and we are, in fact, in the process—we talked about this earlier—of reprogramming existing 1989 funds into the Savannah River upgrades, as well as some other things.

Senator Gore. Well, we are told that the environmental crisis is severe, that the production of tritium is crucial to our national security, but that it, nevertheless, is not important enough to justify the allocation of money to the task.

I have some other questions that I will ask you for the record because my time has expired.

Senator Exon. Thank you, Senator Gore.

Dr. Ahearne, you did not answer the brow-beating that you took from Senator Glenn as to whether or not you would accept continuation of employment.

He said earlier, if you did not hear him, Senator Glenn, he quoted either former President Harding or President Coolidge, I don't know which.

Do you care to comment any further?

Dr. **Ahearne**. Well, it was not really a quote.

Senator **Exon**. We do want to give you a chance.

Dr. **Ahearne**. Thank you, Senator, but I would not accept.

Senator **Exon**. I have one last question, and then I will turn this over to my colleagues if there are further questions.

ENVIRONMENTAL IMPACT STATEMENT

Mr. Wade, I will have some other questions for the record that we will submit to you in writing. The last question I have is this.

The Armed Services Committee received a letter not too long ago from you. In fact, it was dated January 23, 1989, and indicated that the Department of Energy intends to prepare environmental impact statements in accordance with the National Environmental Policy Act on the Savannah River reactors.

What is the scope of this environmental impact statement that DOE plans to prepare?

Do you plan to complete the reports prior to restarting even the first of these reactors?

Also, how much is conducting this environmental impact statement expected to cost?

Mr. **Wade**. Mr. Chairman, a lawsuit was filed against us leading toward enjoining us from operation until we had done an environmental impact statement on reactor operations at Savannah River. Historically, we have had an EIS on only one, on L reactor. We have come up with a strategy wherein we have agreed to do an environmental impact statement on reactor operations, which would cover all three reactors. But we have taken the position, and we believe it is legally supportable, that it is not necessarily a condition of restart.

We have advised the court and the NRDC that, with the approval of this committee, we will move forward to do an EIS but not as a condition of restart. It is expected to take about 2 years, and a ballpark cost estimate would be $10 million to $12 million.

Senator **Exon**. Thank you very much.

Senator Thurmond.

Senator **Thurmond**. Thank you, Mr. Chairman.

The chairman wants to finish the hearing as soon as I finish. So, if you would, please make your answers as brief as you can.

Mr. Moore, much of the burden for changing the so-called safety culture seems to be placed on the Westinghouse Co. How does the experience of the management team that you will have in place at Savannah River give you confidence that you can effect the necessary changes in time to restart the reactors to meet national security requirements?

Mr. **Moore**. Senator Thurmond, as I indicated earlier and in my testimony, we have a very experienced team of Westinghouse people, both in the commercial arena, the Navy nuclear arena, and in operating other DOE reactor facilities.

So, we have a very experienced team.

Also, the team is a group that has worked together. All of us have worked together for some time. So we are not involved in organizing ourselves. We are already on-board and understand our operating organization.

We are combining that with some very capable and experienced Du Pont people in some of the senior positions so that we have a continuity of operations down there.

I think the combination of our experience, the kind of people we have and the genuine interest of the Du Pont people down there to do a good job means that we will be able to accomplish that.

Senator THURMOND. By the way, I want to take this opportunity to officially welcome you to Aiken.

Mr. MOORE. Thank you, sir.

Senator THURMOND. It's one of the garden spots of the Nation.

Mr. MOORE. It certainly is.

ACNFS RECOMMENDATIONS

Senator THURMOND. Mr. Starostecki, you have taken issue with some of the recommendations that Dr. Ahearne forwarded to the Secretary of Energy on December 14, 1988.

Have you and Dr. Ahearne's panel had the opportunity to discuss these differences? How do you expect that these differences will be resolved?

How should we, as laymen, deal with differences of opinion among you experts with respect to the restart of the Savannah River reactors?

Mr. STAROSTECKI. Sir, these I believe, are legitimate disagreements and part of the difficulty is the time that it has taken to get other documents together.

I believe the pressure of timing for reports precluded what I consider a full ventilation of some of these topics.

We will be working within the Department to provide to Dr. Ahearne a response to the letter, and I fully expect that we will have to meet with them. Such meetings are already scheduled by subcommittees that Dr. Ahearne has set up.

We do not expect to have to come to you with the need for an arbitrator.

We do need to ventilate information that is being developed even today.

Senator THURMOND. They say time heals all things. So maybe time will heal this situation.

Mr. Moore, what is your assessment of the time required to bring the formalized and disparate processes and procedures of the commercial nuclear industry to the Savannah River operation?

Mr. MOORE. It's going to take some time. It's going to be years, really, to literally complete the whole transition in terms of the approach, culture, procedures, and so forth.

What we are doing in the transition period right now—we have 2 more months to go, essentially—is to understand the organization, the site, the baseline, the operation, and institute those procedures which we see as priority, critical kinds of procedures and organizational issues, right from the beginning, from April 1.

We are in the process of developing those. We are in the process of training the people on those.

So we believe that, on a priority basis, we will have in place from the beginning the kinds of procedures to get over some of the problems that you have seen recently in terms of operations.

But the overall approach is going to take some time.

Senator THURMOND. Thank you.

Dr. Ahearne, your statement indicates that effective implementation of a nuclear safety policy must be largely subjective.

Given that is the case, what mechanism would you propose to arrive at consensus judgments on restart issues, given the unprecedented press attention that the restart has received?

Dr. AHEARNE. Senator, the point that I made in my testimony, which is also imbedded in the letters of advice we have given the Secretary, is that for these reactors, currently, it is going to have to be based upon subjective judgment.

I went on to point out that trying to establish comparable to commercial standards is a good, working objective, but that is going to take a lot more time than is available in the next year or two.

What we have recommended is trying to bring in people who are expert in understanding not only the DOE reactors but also the commercial world so that they can make that kind of judgment.

Senator THURMOND. Dr. Ahearne, what recommendations do you have for working out the relationships among the various bodies charged with safety review of the Department of Energy complex?

Would you recommend changes in the Safety Board legislation passed by the Congress last year? Or, what suggestions do you have?

Dr. AHEARNE. My committee really has not addressed that, Senator.

I have raised the point that there is an obvious potential conflict between those organizations. But my committee is really not a management advisory group. We see the problem and we have raised the issue.

One of the luxuries, I guess, of being an advisory group is that you can advise on problems, but you do not necessarily have to come up with solutions.

SAVANNAH RIVER RESTART

Senator THURMOND. Mr. Wade, you note that one of the four issues that require resolution before restart is power limits.

I have understood that a technical basis for establishing acceptable power limits is some time away. Is that the case? What are the implications of power limits on restarting the reactors?

Mr. WADE. Let me divide that into two pieces, Senator Thurmond.

There is an issue having to do with power levels at restart, and that is currently under evaluation.

My concern has to do with power levels over the long-term. It is important in terms of the production of tritium that we are able to continue to increase the power level of the reactors from 40 percent to 50 percent, where we were running them when we shut down back up close to 100 percent of power.

So, my concern is in the long haul.

We have a major initiative underway. The goal is to begin to ascend in power in calendar year 1990. The initiative is due to provide to me a report within the next 45 days on what we need to do to be able to ascend in power so that we are running at full power in 1991.

Senator THURMOND. Dr. Ahearne.

Dr. AHEARNE. Senator, I would like to comment on that because that is an issue that has really been of great concern to my committee. It really ties back to this.

There is a comment that Lou Roddis made when he gave his recommendation to Secretary Herrington on the N reactor. I will have to paraphrase it. But the principal conclusion he reached was if the N reactor is going to be required to meet the kind of safety standards that you require for the commercial world, it would have to be shut down, and its operation would require a willingness to run the reactor, recognizing that it would be at a risk that would not be accepted in the commercial world.

The issue is what the National Academy identified was that the analysis to demonstrate that these reactors could operate and handle the type of major accident that they were supposed to be able to handle, that analysis was inadequate.

What my committee has done is looked at where the analysis development is at present, where the experiments are at present. We have concluded that they are just a long way from getting you that kind of confidence.

So, I foresee downstream, at some stage, the Department having to face the issue that Mr. Roddis raised.

Senator THURMOND. Senator Glenn, my time is up.

Thank you.

Senator GLENN [presiding]. Thank you, Senator Thurmond.

We have talked about sensitivity to safety matters and the appointment of the Board.

We have, within the Nuclear Weapons Complex, including Savannah River, experienced about twice the number of forced shutdowns per year that you normally have in civilian reactors on the outside, that are covered by the NRC.

We thought everybody had been sensitized to all of these things and that there would not be any more chances taken, that everything was going to be reported.

Then we had the January 22 valve test, and that went unreported until Tuesday. It happened on Sunday, and it wasn't until Tuesday that anybody in DOE really knew about it or was aware of it.

SAVANNAH JANUARY 22 INCIDENT

Was it that minor an incident, or wasn't that something that should have been reported, Mr. Wade?

Mr. WADE. Senator, the incident happened on Sunday night, January 22, and it was, in fact, reported on the morning of January 23, to the Savannah River Operations Office in a routine daily report.

It was not reported to DOE headquarters until the day following that.

We have an ongoing investigation, looking into both the technical and the managerial problems associated with that incident. I think it is clear that communications broke down. We are told that the Du Pont official in charge made a decision that it was not an incident, that, looking at the engineering aspects, looking through a pair of mechanical engineering glasses, he made a determination that it was not an incident that was reportable in an urgent fashion to the DOE.

Senator **Glenn**. It is my understanding that the manager inadvertently heard about it through overhearing a conversation, a different conversation.

Is that how he was informed?

Mr. **Wade**. That's how one of the DOE safety people was informed. That's correct.

The fact that an error, poor judgment, a procedural violation was made was not taken into account when the man was deciding whether it was reportable or not. That, as I said to you the other day, is unacceptable. We will not allow that to happen.

We continue to work to improve upon that, and hope that the investigation of this January 22 incident will give us a better mechanism, some better ideas about how to fix this in the future. We are not happy with that.

Senator **Glenn**. Mr. Moore, how are you going to reverse that kind of complacency?

Mr. **Moore**. Clearly I would agree that that was a reportable incident. We would set the prescribed standards of what is reported and train people so that they understand that.

If they do not adhere to those procedures, we'll take disciplinary action. We have to show by example.

Senator **Glenn**. Dr. Ahearne, is there any reason why these plants are so special, because they are in the DOE complex, that we can't have the same safety standards that you insisted upon when you were Chairman of NRC?

Dr. **Ahearne**. No.

Senator **Glenn**. They can be just as safe as the other plants?

We have about half the number of scrams at the civilian plants as we have in the DOE plants.

Dr. **Ahearne**. Now scrams are a little different measure, though. I know that Rich has looked at this to some extent and is a lot more familiar with that than I am. I would just point out that a scram in a low pressure, low temperature system is just not as severe as a scram in a high temperature and high pressure commercial reactor.

Mr. **Starostecki**. The issue wasn't really scrams. It was looking at forced shutdown and at the forced shutdown rate. It's not that a forced shutdown is an accident; but it is a precursor. It is an indicator and you have to ask yourself why was the forced shutdown necessary.

When you look at the forced shutdowns and you look at the percentages of them caused by equipment failure and personnel error, and you do a more thorough root cause analysis, you do trace it down to human performance—how people are maintaining the equipment, how they are operating it.

Every time somebody deals with a complex system and does not adhere to procedures, they create the opportunity for the event to progress to an accident.

That is why we view with such seriousness the events of last August, during the startup. There was no accident. But it was indicative of an attitude that didn't reflect the caution we expect—and, as Mr. Wade has said, the same events of the last week.

We have, I think, the need to inculcate in the people there that notification needs to be improved. It needs to reflect the communication between the contractor and DOE, and it is not just another compliance mechanism.

SAFETY BOARD APPOINTMENTS

Senator GLENN. What is the status, Mr. Wade, of appointments to the DOE Defense Nuclear Safety Board? Can you give us a report on that?

Mr. WADE. Senator Glenn, my memory says that the President is required to make those nominations to the Senate by the end of March.

I am personally unaware of what activities are ongoing in the White House in preparation for that. It is an executive branch action. But I don't know what they are doing.

Senator GLENN. Okay. Fine.

REACTOR RESTART SCHEDULE

This will be my last question on this time period.

Is it the plan to fire up all the reactors, P, K, and L again, for tritium production?

Mr. WADE. It is the goal to fire them. Yes, we need all three reactors running, Senator.

Senator GLENN. But what we are talking about timewise—is it just the P reactor that we have been referring to, as maybe not being restarted this year.

Mr. WADE. K is the one we'll start first.

Senator GLENN. Yes, I mean K.

How about the others? How about P and L? Are they just in some indefinite-in-the-future status?

Mr. WADE. Again, in our planning, we are focusing on K reactor. That focus will in fact, end up delaying perhaps the restart of the other two reactors. But, for planning purposes, we are talking about restarting K, restarting L 3 months after that, and restarting P 3 months after that.

So we have spread it out over a 6-month period.

Senator GLENN. Thank you.

Senator Thurmond.

Senator THURMOND. Thank you, Mr. Chairman.

COMPLIANCE WITH NRC STANDARDS

Mr. WADE. Mr. Starostecki, and Mr. Moore, I would like to ask you this question.

How would you respond to Senator Glenn's suggestion that DOE reactors meet NRC standards?

Mr. **Wade**. I guess my answer, Senator Thurmond, would be that the Department has taken the position that the DOE reactors should be operated in a manner comparable to commerical reactors.

I do not believe that the DOE reactors, as old as they are, can meet current NRC standards. But I believe we can meet the spirit of those standards.

Senator **Thurmond**. Would that be safe?

Mr. **Wade**. Absolutely.

Senator **Thurmond**. Mr. Starostecki.

Mr. **Starostecki**. Senator Thurmond, you have to look at the NRC and how they apply their own standards to some of their older machines.

I agree with Dr. Ahearne and what he said earlier. We do need to exercise judgment.

When you look at 25- or 30-year-old commercial reactors, there have to be very knowledgeable, experienced estimates made of what does buy safety. This is an area of concern to me.

We need to look at the areas that the NRC requirements address and make sure that we have appropriate measures in place for the DOE facilities.

The NRC standards were written for a generation of light water reactors, and, in some cases, they have blind spots in them when it comes to a different kind of technology.

But, more importantly, I think we have to look at the issue to avoid this notion of blind adherence to a set of requirements. We have to look at the technical issues being raised and have them addressed sufficiently.

I think Dr. Ahearne has addressed that well in his comments to the Department.

Senator **Thurmond**. Mr. Moore.

Mr. **Moore**. First of all, I'd say that when the reactors restart, they will be run safely. I think the NRC requirements serve as a good vehicle for an evaluation of where we are, reflecting, as Mr. Starostecki said, the aspects that are there. It is an older plant and we have older commercial plants which meet the various regulations in different ways.

What we have to do is take those policies, those criteria and adapt them, as appropriate, to the condition of the reactors there at Savannah River.

There are low pressure/low temperature plants, but they are old.

I think we can do that and we can essentially meet the spirit of the NRC requirements, as adapted to what the actual situation is.

Senator **Thurmond**. Dr. Ahearne, you seem to have put more emphasis than the other witnesses on technical improvements that must be made before we should consider restarting the Savannah River reactors.

Is this a proper characterization of your conclusions? If so, are they based on your experience with other reactors, or specific concerns that you have about the physical condition of the Savannah River reactors?

Dr. AHEARNE. No, that is not a correct characterization. I suspect that it is the characterization that has been described by some people.

The letter that my committee wrote to the Secretary made it very clear that our major concerns had to do with the overall safety criteria being established, the absence of a safety philosophy and problems with management.

We have several times stressed that the people problem is probably the hardest to come to grips with.

Now, we also went through and listed a number of technical issues because that was part of what the Advisory Committee was supposed to do. But the technical fixes were not the primary focus of my committee.

Senator THURMOND. Mr. Moore, there seems to be an agreement that there will be well-defined lines of responsibility and that the operator have sole responsibility for the safe operation of the reactors.

How is this different from current procedures?

Also, is there any inconsistency in giving sole responsibility for safe operation to operators and giving safety organizations shutdown authority?

Mr. MOORE. As we look at the currrent situation, Senator, we don't see those exact prescribed lines of responsibility defined at the moment at the site. There are also many different layers of management that we think we can streamline and simplify, particularly the whole issue of the Du Pont-Wilmington responsibility versus those at the site.

We will definitely simplify those and streamline them.

I think the comment I made in my testimony about having shutdown responsibility, both for myself and my independent oversight organization—it is really a check and balance. I expect the vice president for operations to manage that facility safely and to take that action.

I will be disappointed if my ES&H and QA vice president has to take action to shut down. I would expect the operations man to do that himself.

So, I don't see a dichotomy or a conflict in that whole management process.

Senator THURMOND. Mr. Chairman, I have about two more questions.

Senator GLENN. That's fine. Go ahead. We are trying to wind this down as soon as possible because we have to get some of the same witnesses back here by 2 o'clock.

Senator THURMOND. Did you finish your answer, Mr. Moore?

Mr. MOORE. Yes, sir.

LINES OF RESPONSIBILITY

Senator THURMOND. Mr. Starostecki, would you care to comment on the issue of well-defined lines of responsibility?

Mr. STAROSTECKI. I think clear lines of responsibility and accountability are essential for assuring safety.

At the current time, there is confusion at the site. This is evidenced most clearly by the events of last week. We find that there are, even within the Du Pont site, various organizations that have responsibilities within one reactor.

For example, somebody belonging to the power department can do something and somebody in the reactor department, who, in fact, is responsible for the reactor operations and the control room, has no say over how valves and systems are manipulated.

So this is clearly something that needs to be addressed. I think Westinghouse has started to address this with the right issue. And, once there are clear lines of responsibility and accountability, I believe that the Department itself needs to look at how we are managing the Savannah River Operations Office and how we relate, from an oversight standpoint, to both Mr. Wade's organization and to Mr. Kaspar's organization.

There is, I think, going to be further inquiry as to how we, within the Department, carry out our oversight responsibilities and our line management responsibilities.

Senator **Thurmond**. I have just one more question now, of Mr. Wade.

Some have suggested that DOE headquarters is responsible for confused lines of authority with respect to the operation of the reactors. I want to give you a chance to respond to that in public, so that you can be on record.

Mr. **Wade**. Well, I don't believe that is true, Senator.

I think we have long taken the position that the safety authority was on the line, was in the line, and that the man running the reactor and the man in the field has the safety responsibility.

Certainly, headquarters officials, such as me, have a responsibility to promulgate that safety authority, and officials, such as Mr. Starostecki, have a responsibility to provide oversight.

But the ultimate responsibility is in the line, and I do not believe there is a disagreement there.

Senator **Thurmond**. Mr. Wade, I want to take this opportunity to express my confidence in you and in the fine job you have done, from all I have heard about your work.

Mr. **Wade**. Thank you, Senator.

Senator **Thurmond**. Mr. Starostecki, I want to thank you and Mr. Wade and Dr. Ahearne, and also Mr. Moore, all for being here. It is nice to get so many brains here at one hearing, so many experts.

I am sure that because you are experts, you will get together in a reasonable time on the consensus. [Laughter.]

Thank you all very much.

Thank you, Mr. Chairman.

Senator **Glenn**. Thank you, Senator Thurmond.

We are going to wind down now and give everybody a little break.

We meet again at 2 o'clock. Mr. Wade will be back. Mr. Brush will not be on our agenda this afternoon. Is someone replacing him?

Mr. **Wade**. Mr. Berube will be here.

Senator **Glenn**. Mr. Berube was on our original list. So it will be the two of you, Mr. Berube and Mr. Wade.

Mr. **Wade**. That's correct.

Senator **Glenn**. The subject this afternoon will be receiving testimony on modernization of the Nuclear Weapons Complex.

Thank you all, gentlemen. You have been very patient with us this morning. We appreciate your testimony.

The committee will stand in recess until 2 o'clock today.

[Questions for the record with answers supplied follow:]

Questions Submitted by Senator J. James Exon

TECHNICAL TALENT LACKING

Senator **Exon**. Mr. Starostecki, in what areas is technical talent in DOE lacking and how can it be obtained?

Mr. **Starostecki**. The DOE line organizations (managers and staff) in general have not remained current with nuclear safety technology. This includes the various analytical and engineering disciplines associated with nuclear facility design, safety analysis, safety research, construction, and operations. Although there may be selected individuals who have such expertise within the DOE, the technical depth and number of staff are very limited.

Technology vigilance by DOE is difficult, if not impossible, unless there are technical DOE personnel with experience in the selected disciplines. Such disciplines include as a minimum the various fields of engineering, health physics, human factors, operations, research, and reactor dynamics.

Technical talent within a management organization has been shown to be an important element involved in hazardous activities. It is the responsible line manager who ensures that the right personnel are recruited, hired, and trained for the task at hand.

RELATIONSHIP AMONG DOE HEADQUARTERS, FIELD OFFICES, AND CONTRACTORS

Senator **Exon**. Mr. Starostecki and Mr. Wade, during testimony before this committee last October, former Deputy Secretary Salgado said there has been a "failure of DOE to manage the contractor or a failure of contractors to communicate with DOE." This has been repeatedly demonstrated by events at Savannah River where there has been a failure of communication between the contractor, the DOE field office, and DOE headquarters both in the restart of the P-reactor last summer, and in a recent valve test at one of the reactors. What changes, if any, would you recommend between the relationship of the contractor and DOE, and between DOE field offices and DOE headquarters?

Mr. **Starostecki** and Mr. **Wade**. The Department recognizes the need to strengthen its oversight of the contractor at SRP and to implement more timely reporting of events from the contractor through the field office and to DOE headquarters. To strengthen its line management oversight role, the Department has begun a comprehensive program to revise operating and management procedures at SRP, and has strengthened its onsite technical vigilance and monitoring of contractor performance by increasing the number and training of DOE technical personnel and stationing DOE personnel in the reactor building. This program has both short and long term goals, recognizing the fact that some aspects of these necessary changes must be implemented prior to restart of a reactor at SRP. The long term goals will be part of a continuing effort to ensure safe operation and continued technical vigilance of the contractor.

In order to ensure more timely reporting the events from the contractor through the field office and to DOE headquarters, DOE has issued a notice entitled "Preliminary Notification of Environment, Safety and Health Concerns" which requires operating contractors to notify their respective field office of significant concerns within four hours. That office must immediately submit preliminary notification to the Headquarters Emergency Operations Center which then informs the appropriate program and safety oversight personnel.

SAFETY RESPONSIBILITY

Senator **Exon**. Mr. Starostecki, you have said that it is the responsibility of DOE line management to render judgment on whether a reactor, for example, can be operated with "adequate protection to the public and the workers" and that oversight bodies cannot be asked to assume these basic responsibilities of line managements.

Why, in your opinion, should oversight groups not be responsible for safety and line management be responsible for production? Is it wise to separate responsibilities for production and for safety?

Mr. STAROSTECKI. Experience has shown that the line organizations responsible for the operation of the facilities in question must be responsible for their safety, otherwise the crucial link between operations and safety is lost. This has been shown to be true in the commercial nuclear power industry as well as the U.S. Space Program where responsibility is placed in the hands of managers with immediate access to the facility with the ability to provide the necessary budget, and the ability to direct day-to-day allocation and application of the resources. The function of safety oversight is threefold:

(1) To develop safety standards;
(2) To assist in uniform implementation of those standards; and
(3) To assure those standards are effectively met.

If the oversight organization becomes involved in the responsibility for safety, then it must have line authority to control operations, and allocation budget resources. In such a mode of operation, the oversight organization would be measuring its own performance against the standards it had established. This is clearly a situation involving conflict of interest and does not provide a system of checks and balances. Safety concerns must be the responsibility of the organization that manages the facility. This does not mean that production and safety are mutually exclusive; production needs should not compromise safety.

REACTIVITY CONTROL SYSTEM

Senator EXON. Mr. Starostecki, in your review you indicated that a "complete walk through" of the reactivity control system is not appropriate. Can you please describe a "complete walk through" and why you believe it is not appropriate?

Mr. STAROSTECKI. A complete walk through of the reactivity control system would involve visually identifying and inspecting every component, switch, relay, wire and connection in the entire system, verifying that it is correct and installed in accordance with the drawings and that it functions properly. I do not believe it is necessary to undertake this massive effort at this time, because the overall improvement in safety achieved by such a walk through would not be significant. A complete walk through is not necessary for several reasons:

> A partial walk through of the system during preparations for power ascension will be adequate to disclose whether the system has configuration problems. The only difference between partial and complete walk throughs is the number of components that are individually verified to be in a state of readiness.
>
> Walk throughs in themselves are not adequate to assure system readiness and reliability.
>
> Confirmation of safety rod latching is also important to reliability of reactivity control.
>
> Technical specifications on reactivity control system operation are a more effective means of long term control of system reliability.

The reactivity control system has performed well for many years in spite of its age and lack of conformance with modern criteria. A greater concern to me is the level of experience and training of the operators and managers of the Savannah River reactors. When these areas are brought to an acceptable level, then we will have achieved a much greater improvement in safety than if the entire reactivity control system was replaced with the most modern system available.

DETECTING CRACKS IN REACTOR VESSELS AND COOLANT SYSTEMS

Senator EXON. Mr. Starostecki, reports have indicated that both the reactor vessels and the reactor coolant systems at Savannah River are susceptible to cracking from stress corrosion. What is DOE's approach to detecting and correcting cracks and do you believe the current approach is adequate for the restart of the Savannah River reactors. Will ultrasonic testing be conducted and, if so, how long is such testing expected to take?

Mr. STAROSTECKI. Ultrasonic inspections of selected pipe welds in the primary cooling system have been done for some time at the Savannah River reactors. Portions of the piping system are not accessible with the technology in use at the site. Areas other than welds have now been found to be susceptible to cracking. No systematic inspection program now exists for those areas. The contractor and DOE line management are developing an integrated program plan of inspection, repair and assessment. The essential attributes of such a long term primary system (piping and reactor vessel) integrity plan need to address:

Inspection methods, including personnel qualifications;
Inspection schedules related to material conditions;
Identification and documentation of sensitized areas of piping;
Timely independent examination of removed components;
Feedback from failure data to the ISI program;
Stress improvement mitigation processes (e.g., heat sink welding-induction heating);
Removal of external chloride sources; and
Water chemistry improvements.

I am reserving judgment on the resolution of concern over cracks in the primary system (piping and vessels) at the Savannah River reactors until I have had a chance to review the proposed program, once it is developed. The review will include many factors such as the likelihood of significant failure in existing and potential cracks, the safety implications of potential failures, and the viability of techniques for the early detection of leaks before they pose significant problems.

The equipment needed to perform ultrasonic inspection of the reactor vessel walls is expected to be operational by mid-year 1989. Portions of the vessel may likely be inaccessible with this technology and alternative approaches for assuring adequacy of safety margins will need to be included as part of the integrated plan.

QUALITY ASSURANCE

Senator EXON. Mr. Wade and Mr. Starostecki, Dr. Ahearne's committee recommended that a comprehensive and integrated quality assurance plan be developed and in place prior to reactor restart. Is such a plan being developed and who is responsible for it?

Mr. WADE and Mr. STAROSTECKI. DOE-Savannah River (SR) is responsible for the development of the plan and is in the process of revising their quality assurance (QA) procedures which will be approved for incorporation into their QA manual prior to restart of a reactor. DOE-SR will ensure that Westinghouse will implement QA procedures and practices that meet DOE requirements.

ORGANIZATIONAL STRUCTURE

Senator EXON. Mr. Wade, the trend of recent years has been to increase the amount of safety oversight for DOE's defense programs. Safety oversight organizations now include DOE's own internal safety, health and quality assurance organization, Dr. Ahearne's advisory committee, and the legislatively-established Defense Safety Board. There has, however, not yet been a concommitant effort to raise the stature of DOE's defense programs so that they are able to be responsible and accountable for safety at the operating level. Do you believe such an effort is necessary either through establishing an Under Secretary for Defense Acquisition within DOE or through other means?

Mr. WADE. The Advisory Committee on Nuclear Facility Safety, the pending Defense Nuclear Safety Board, and the Department's Office of Environment, Safety, and Health have complementary functions with regard to overseeing the safe operation of the DOE complex. With the establishment of these organizations along with the leadership changes in the new administration, there is a need for the Department to reassess its organizational posture with respect to safety at the operating level. At this time, however, it would be premature to speculate that elevating Defense Programs within DOE, or other organizational actions, would enhance the Department's effectiveness and efficiency at the operating level. I am sure that Secretary Watkins will consider these factors when he addresses the Department's and Defense Programs' organizational options. Any required statutory changes will also be addressed as part of any organizational options that Secretary Watkins considers.

CONTROL ROD SAFETY

Senator EXON. Mr. Wade, the advisory committee recommended that DOE fund the development of a more reliable latching mechanism that also provides for a positive indication of latching to improve safety and operating efficiency. Does the fiscal year 1990 budget request recommend such funding?

Mr. WADE. The Department does not presently have a project that will provide a positive indication of control rod latching. However, as part of their post reactor startup safety program, the Department will evaluate such a project, its priority to other reactor safety projects, and will fund this project if appropriate through the budgetary system at the earliest possible time. In the interim, the Department will assure that the control rods are latched through visual inspection when any reactor is restarted. At this time, the Department does have a project funded for fiscal year 1990 that will provide replacement of all control rod positioning amplifiers in the reactors. These new amplifiers will replace equipment that has been in service for approximately 30 years.

OPERATIONAL READINESS REVIEWS

Senator EXON. Mr. Wade, is DOE developing an overall policy, as recommended by the Advisory Committee, for conducting operational readiness reviews that will provide a consistent policy for reactor operations throughout DOE?

Mr. WADE. The Department agrees with the Advisory Committee's recommendation and is in the process of developing a Restart Program policy. We plan to implement the policy by the end of fiscal year 1989. The policy will define responsibilities and prerequisite safety reviews necessary to authorize a restart after an unplanned shutdown of a DOE nuclear facility due to safety concerns.

DOE line management is responsible for establishing the requirements and criteria for Restart Programs. EH will be responsible for independently reviewing each facility's Restart Program, and conducting independent inspections on a sample basis of the facility prior to Restart. The line program organization will be responsible for conducting all activities necessary to meet the Restart Program requirements and criteria. The Program Secretarial Officer is responsible for obtaining EH concurrence prior to authorizing the restart of a facility.

AWARD FEE INCENTIVE

Senator EXON. Mr. Wade, the Advisory Committee recommended that high levels of safety performance by DOE contractors should be rewarded by positive, as well as negative, adjustments in the award fee. Will DOE's contract with Westinghouse include a provision that makes safety performance part of the award fee evaluation and can safety performance impact the award fee in both a positive and negative manner?

Mr. WADE. The answers are yes to both parts of the question. Safety performance is included in the performance evaluation. Safety does not stand alone. We are currently in the process of reviewing and finalizing the specific performance evaluation parameters for the Westinghouse contract, with emphasis on safety and quality of operations.

REACTIVITY CONTROL SYSTEM

Senator EXON. Dr. Ahearne, your committee stated that "a reliable reactivity control system is essential for the safe operation of any reactor." Can you explain why your committee believes a thorough verification of the status of the entire control rod system is essential prior to restart?

Dr. AHEARNE. A reliable control rod system is universally recognized as an essential feature of a nuclear reactor. The control rod system of the Savannah River reactors is not reliable. There has been a continuing problem of; (a) Unwanted control rod motion as a result of "cross-talk" among control amplifiers; (b) rods sinking into the core; and (c) unreliability of the servo mechanisms of the rods drives.

More recently, there has been a reported incident of rods sticking together leading to unwanted rod motion.

Perhaps of greater significance is that latching mechanisms for the rods do not reliably engage the rods. Operators are not assured the rods they are extracting are indeed actually being moved. Engagement can only be assured if the tops of the rods are visually inspected or rods are moved and temperature variations in the core detected.

The consequences of the unreliability of the control rod system has already been seen. Failures of the control rod system have been encountered so often that these failures provide a convenient, readily-believed explanation for abnormal behavior of the reactors—an explanation evoked in the P-reactor restart incident when, in fact, quite a different problem with reactor operation was occurring. A power excursion, which is as yet poorly understood but may be due to quirks in control rod behavior, preceded the shutdown of P-reactor.

Difficulties with the control rods at the Savannah River reactors are well-known to the Savannah River Project personnel. A plan to upgrade and maintain this system has been "on the books" for years. Refurbishing one-third of the control rod drive mechanisms has been planned prior to restart. Expansion of this refurbishing effort to include all drive mechanisms prior to restart is essential to: (a) Make operators sufficiently confident in the system that they do not use its deficiencies as a plausible explanation for unexpected reactor behavior; and (b) Malfunctions in the system do not interrupt the reactor restart effort once it is initiated. Failure to complete refurbishing the control rod drive system risks a repetition of the P-reactor restart incidents.

FUNDING FOR SAFETY IMPROVEMENTS AND FACILITY MODERNIZATION

Senator EXON. Dr. Ahearne, your committee's report of December 6 states that you found "quite noticeable the difference between the level of modernization at the facilities that Naval Reactors supports and that for the facilities at Savannah River, Hanford and [Idaho]" that DOE's defense programs and civilian nuclear energy programs support. You concluded that "there are definite lessons to be learned about funding for modernization of facilities and safety improvements." What lessons would you draw that you would suggest should guide the funding of safety improvements and facility modernization at DOE?

Dr. AHEARNE. The Advisory Committee believes that there are a number of lessons to be learned about DOE's operations that directly or indirectly affect the planning and funding for the modernization of facilities and safety improvements.

First, the Department and its contractors cannot afford complacency in its operations nor tolerate isolation from the progress being made by the commercial nuclear industry since the Three Mile Island accident. Rather there need to be a rapid assimulation of such experiences, including a thorough understanding of the changes found necessary to be made to commercial nuclear power plants to assure safety. Those upgrades and improvements found appropriate and applicable to DOE's facilities and operations should be considered for future funding.

Second, as an important part of assuring the safe and reliable operation of its research and production facilities, the Department must set budgetary priorities that reflect due recognition that the long-term deferral of needed maintenance and of upgrades to meet modern plant standards can lead to serious threats to plant integrity and safety.

Third, the Department needs to establish a clearly defined safety policy for the operation of its facilities and to use this policy along with safety requirements as the basis for establishing priorities within the overall DOE budget.

Fourth, the planned replacement of aged or outmoded facilities should be considered and budgeted for long before concerns over their continued operation is considered a serious safety question. Modernization of facilities should be part of a continual appraisal of performance, production efficiency and plant safety.

With regard to the facilities supported by Naval Reactors, they reflect the benefits of having had a program advocate in the budget debates and they show the attention to funding upgrades and to detailed maintenance that are necessary if the program is to remain viable. The same level of funding and concern was not visible in the other facilities we had visited.

QUALITY ASSURANCE

Senator EXON. Mr. Moore, Dr. Ahearne's committee also recommended that Westinghouse review and evaluate the quality assurance plan developed by DOE. To your knowledge has Westinghouse been asked to engage in such an effort?

Mr. MOORE. The Westinghouse Savannah River Company (WSRC) is working with DOE and Du Pont to develop and implement a comprehensive and integrated quality assurance plan prior to reactor restart. This plan is one element in the total program supporting resolution of key issues prior to reactor restart.

[Whereupon, at 12:37 p.m., the committee recessed, to reconvene upon the call of the Chair.]

SAFETY, MODERNIZATION, AND ENVIRONMENTAL CLEANUP OF THE U.S. NUCLEAR WEAPONS COMPLEX

THURSDAY, FEBRUARY 2, 1989

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

MODERNIZATION OF NUCLEAR WEAPONS COMPLEX

The committee met, pursuant to notice, at 2:09 p.m., in room SR-222, Russell Senate Office Building, Senator J. James Exon presiding.

Committee members present: Senators Nunn (chairman of the committee), Exon, Kennedy, Bingaman, Glenn, Gore, Wirth, Warner, Thurmond, Wallop, and Gorton.

Committee staff members present: Arnold L. Punaro, staff director; John N. McConnell, systems manager; Sherri Wasserman Goodman, William E. Hoehn, Jr., T. Kirk McConnell, Michael J. McCord, professional staff members.

Minority staff members present: Inga B. Schoonover, special assistant; Robert F. Bott, professional staff member.

Staff assistant present: Mickie Jan Wise.

Committee members' assistants present: Jeffrey B. Subko, assistant to Senator Exon; William J. Lynn and Christopher E. Paine, assistants to Senator Kennedy; Edward M. McGaffigan, Jr., assistant to Senator Bingaman; Terrence M. Lynch, assistant to Senator Shelby; James M. Bodner, assistant to Senator Cohen; Jack D. Crouch II, assistant to Senator Wallop; Christine Dawson, assistant to Senator Gorton.

OPENING STATEMENT BY SENATOR J. JAMES EXON, PRESIDING

Senator EXON. The committee will please come to order.

I am pleased to announce to everyone here that the television cameras will not be on and the lights as well. That's good news because it got pretty warm in here this morning and we are not used to the lights shining in this particular room. We generally have closed sessions of the Armed Services Committee here.

The best news of all is that I tend to notice that I, and others, as well, spend less time asking questions if there are no television cameras. It speeds things along just a little bit. [Laughter.]

This afternoon, the committee meets to receive testimony on the modernization and cleanup of the Nuclear Weapons Complex. The fiscal year 1988 Defense Authorization Act required the President to formulate a plan to modernize the nuclear weapons complex, including ensuring that facilities are operated in a safe and environmentally acceptable manner.

As I stated this morning, this report, plus other reports by the DOE and others, indicate that the costs of modernization and cleanup are absolutely staggering.

According to these studies, the funding for the DOE's defense programs will have to go to an increase of $3 billion to $4 billion a year for each of the next 20 years.

The task before the Armed Services Committee this year is to develop a practical approach to funding modernization incrementally, but steadily, over the next many years.

The 2010 Report is the first step in developing such a plan. But it is only a first step. We still have a long way to go in developing and implementing a plan that sets priorities for both cleanup and modernization and ties them to specified annual funding levels.

Accordingly, the Armed Services Committee and my subcommittee plan to hold a number of hearings and solicit from a wide spectrum of Government, public, and private sources, suggestions and recommendations for the establishment of priorities.

As I said in my opening remarks this morning, the objective of the modernized DOE complex must be no less than centers of excellence at each and every site.

The Armed Services Committee looks forward to working with the new administration in addressing this problem and expects to hear from others in the coming weeks.

We are pleased to have with us this afternoon some of the key individuals who conducted the modernization study.

We welcome back Mr. Troy Wade, of the Department of Energy. I say again, Mr. Wade, that you, as Acting Assistant Secretary for Defense Programs in the Department of Energy, have been particularly helpful to us throughout this whole ordeal and we appreciate very much the fact that you are here with us.

In addition, we have with us today Mr. Raymond Berube. Mr. Berube is the Deputy Assistant Secretary for Environment of the Department of Energy.

Gentlemen, we certainly want you to feel free to give us all your advice, to answer our questions as directly and fully as you can, and, if there are any points that we do not raise and that you think are important, please, in some manner, meld them in to your response to other questions.

The chairman will make sure that you have time to do this because we think this is a particularly important hearing.

What we would like to have you highlight, if you can, is your ideas and your views on all matters, including the following. What are the major planning assumptions that underlie the 2010 Study? What are the major analytical assumptions in the 2010 Study? Here I mean items such as your assumed funding stream for environmental restoration.

Why is there no transition plan showing the sequestering and the year-by-year funding requirements needed to move from 1989 to the desired 2010 outcome?

From the materials that you now have in hand, how quickly could we reasonably expect the new leadership at DOE to develop such plans?

Before we begin, I would like to yield, at this time, to my great friend and colleague, the ranking minority member of this committee, Senator Strom Thurmond of South Carolina.

Senator THURMOND. Thank you very much, Mr. Chairman.

Mr. Chairman, I join you in welcoming our witnesses this afternoon, and I look forward to their testimony on the modernization of the nuclear weapons complex, the so-called 2010 Study.

This study originated from a requirement in the Committees on Armed Services in the Senate and House that there be a comprehensive look at the modernization of the nuclear weapons complex to support long-term national security objectives.

This Senator, in particular, is concerned that the investments that we are making today in plant and capital equipment are supportive of an overall investment strategy aimed at satisfying the requirements of nuclear deterrence for a safe and environmentally sound complex.

The study, as received, is very informative about requirements and priorities over the next 20 years. However, it does not provide a proposed spending plan that would guide the work of the Congress in providing authorization and appropriations of funding to carry out the modernization and cleanup actions identified.

In the course of questions today and in working with the Department of Energy over the next several months, I will want to bridge the findings of this study with the details of the budget that is currently under consideration. In my judgment, it will be imperative that all of our recommendations regarding the current budget request can be rationalized with a long-term acquisition strategy.

Mr. Chairman, I note that the study finds, as we heard this morning, that the near-term supply of tritium is at risk because of the safety-related issues with existing SRP reactors.

This Senator and this committee are most anxious to receive and to act on the reprogramming actions required to effect changes at the Savannah River reactors that will permit the safe and reliable operation of these reactors until a new production reactor capacity becomes available.

I also note that the report finds that the replacement of existing reactors with new production reactor capacity is urgent and essential to assure an uninterrupted supply of tritium for long-term support of the stockpile.

Our witnesses know that this committee strongly supports a new production reactor program, and I have made no secret of my support for construction of a new reactor at the Savannah River Plant, where the infrastructure already exists to support tritium production.

Mr. Chairman, I will have a number of questions to pose to our witnesses at the appropriate time.

Thank you for your leadership in this matter.

Senator EXON. Thank you very much, Senator.

At this time with the agreement of the other members, I would like to recognize Senator Kennedy. He has a firm commitment at 3 o'clock. We all have conflicting schedules, but he would like to make a brief opening statement and then have a brief period of questioning.

As the chairman, I would be glad to yield my first round to him.

So, without objection, I might ask, Senator Bingaman, do you have any opening statement?

Senator **Bingaman**. I do not, and I think Senator Kennedy was here ahead of me, anyway.

I have no statement.

Senator **Exon**. I am going to try to give him the right to ask questions ahead of time.

Senator **Bingaman**. I see.

I have no statement.

Senator **Thurmond**. Mr. Chairman, I would be glad to yield my first round to the Senator.

Senator **Kennedy**. Thank you.

Senator **Exon**. I would recognize you, Senator Kennedy, for your opening statement, and then you take whatever time you need. You would have 5 minutes from the Chair, that I will yield to you, as a first round of questions.

Senator **Kennedy**. I thank the Chair and the ranking member.

If I could make just a brief opening statement first, if we could hear from the witnesses—it seems they have a reasonably short statement and it shouldn't take too long—and then if I could get recognition at the conclusion of their presentations, I would be grateful to you.

Senator **Exon**. Fine.

Senator **Kennedy**. In his inaugural address, President Bush spoke of a new breeze blowing through Washington bearing a fresh perspective on our Nation's most pressing challenges. High among these are the long-deferred problems in our Nation's nuclear weapons production complex.

While the 2010 Study represents a welcome attempt to frame a long-term solution, the windows at DOE need to be opened wider to catch more of that new breeze the President spoke of.

The nuclear weapons production complex has been called a giant corporation that would rank in the top quarter of the "Fortune 500." But, if this complex really were a corporation, it would be in Chapter XI because past mismanagement has generated an enormous unpaid liability to the American people.

Unfortunately, the 2010 Study is incomplete in two important ways.

First, its recommendations would leave a large fraction of that liability unpaid in the areas of radioactive waste disposal, decontamination, and environmental restoration.

Second, the 2010 Study assumes massive new investments in equipment and facilities to sustain and modernize a nuclear weapons stockpile of roughly the present size. I am surprised and disappointed that the study omits an analysis of the future complex under alternative arms control possibilities. The Department expressly stated last March that such an analysis would be included.

For example, a scenario of deep reductions, coupled with a low-threshold or Comprehensive Test Ban Treaty by the year 2000, would have a dramatic effect on both the nuclear weapons research and the materials requirements assumed by the 2010 Study.

The failure to analyze a range of alternatives is a serious omission. It deprives Congress of the information needed to assess the budget dividend from future arms control agreements. And it is clear that such agreements would free up substantial resources from modernization that could be used for environmental restoration and waste disposal. The question is, how much?

Maintaining a stockpile of considerable size will require a substantial level of fixed investment in nuclear weapons construction by the Department of Energy. But surely the Department is not maintaining here that the guidelines in the 2010 Study are completely insensitive to arms control. For example, the modest 30 percent overall reductions sought in START would give rise to a surplus of plutonium from the retirement of existing warheads. That surplus would surely not justify the current "Priority 1" ranking assigned to the Special Isotope Separation plant now planned for construction by the Department of Energy.

In fact, in light of the more pressing requirement to restore our tritium production capability, nothing in the 2010 Report justifies the special urgency attached to the SIS plutonium project, even without a START agreement.

This SIS project to produce new weapons grade plutonium also has to be weighed against the need to upgrade and relocate our capacity to recycle the large backlog of plutonium that already exists.

It makes sense to put our recycling capability on a secure footing for the long haul before we worry about generating even more plutonium for weapons.

In light of these considerations, I hope the Department of Energy in the new administration will be willing to work more constructively with this committee, so that we can take a fresh look at the priorities in the 2010 Study. I see that as one of the early measures of the real strength of the new breeze that we have all welcomed.

I thank the Chair.

Senator Exon. Thank you, Senator Kennedy.

Mr. Wade, we are pleased to recognize you and, once again, thank you for having been with us this morning and thank you for coming back this afternoon.

STATEMENT OF TROY E. WADE II, ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS, DEPARTMENT OF ENERGY, ACCOMPANIED BY RONALD W. COCHRAN, ACTING DIRECTOR, OFFICE OF NEW PRODUCTION REACTORS, DEPARTMENT OF ENERGY

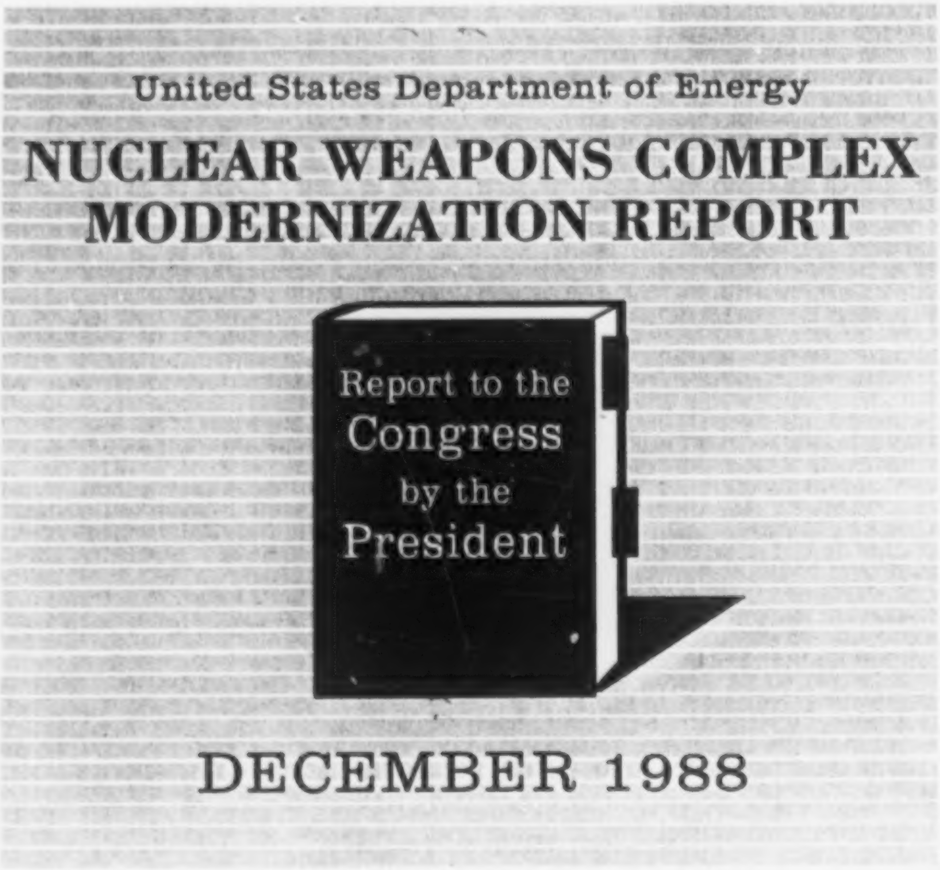
Mr. Wade. Thank you, Mr. Chairman and members of the committee.

Mr. Chairman, in the audience with me today are two gentlemen on whom I may call, with your concurrence, for help with questions. I have Mr. Jim Nicks, who is Director of the Modernization Task Force, and Mr. Ron Cochran, who is Director of the Office of New Production Reactors.

I have a detailed statement for the record, which I would submit, and I would like to move right to a briefing on the modernization study itself.

Senator **Exon**. Without objection, we will accept your full statement as a part of the record.

Please proceed in any way that you see fit.



United States Department of Energy

NUCLEAR WEAPONS COMPLEX
MODERNIZATION REPORT

Report to the
Congress
by the
President

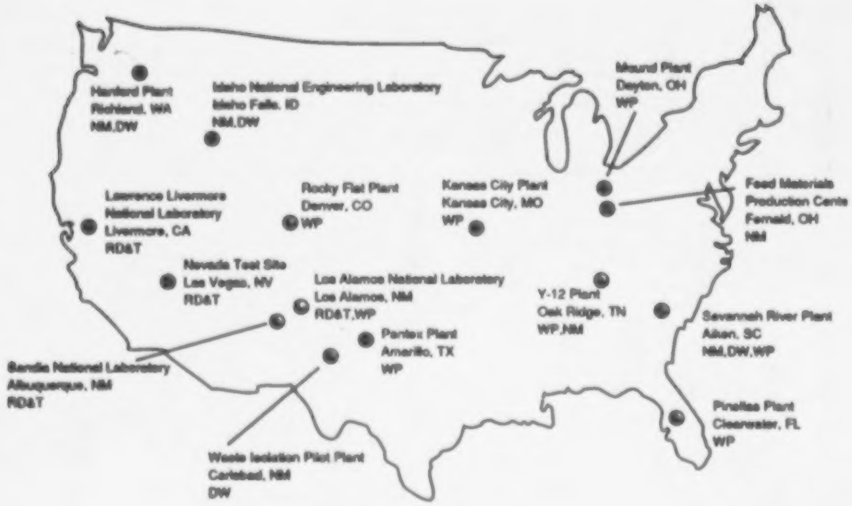
DECEMBER 1988

Mr. **Wade**. As was pointed out, Mr. Chairman, Public Law 100-180, section 3132, required the President to conduct a study and develop an implementation plan and prepare a report having to do with the modernization of the Nation's nuclear weapons complex.

National Security Decision Directive 302 from the President to the Department of Energy directed the Secretary of Energy to conduct that study and prepare that implementation plan.

That report, which is classified, was submitted by the President to Congress on January 12 of this year. It is only a roadmap, but it is, in fact, the best set of data that we have had on the nuclear weapons complex for many, many years, perhaps better than we ever have had.

Nuclear Weapons Complex of Today


Hanford Plant
Richland, WA
NM,DW
Idaho National Engineering Laboratory
Idaho Falls, ID
NM,DW
Mound Plant
Dayton, OH
WP
Lawrence Livermore
National Laboratory
Livermore, CA
RD&T
Rocky Flat Plant
Denver, CO
WP
Kansas City Plant
Kansas City, MO
WP
Feed Materials
Production Cente
Fernald, OH
NM
Nevada Test Site
Las Vegas, NV
RD&T
Los Alamos National Laboratory
Los Alamos, NM
RD&T,WP
Y-12 Plant
Oak Ridge, TN
WP,NM
Savannah River Plant
Aiken, SC
NM,DW,WP
Pantex Plant
Amarillo, TX
WP
Sandia National Laboratory
Albuquerque, NM
RD&T
Pinellas Plant
Clearwater, FL
WP
Waste Isolation Pilot Plant
Carlsbad, NM
DW

Let me begin by showing a map of the nuclear weapons complex of today.

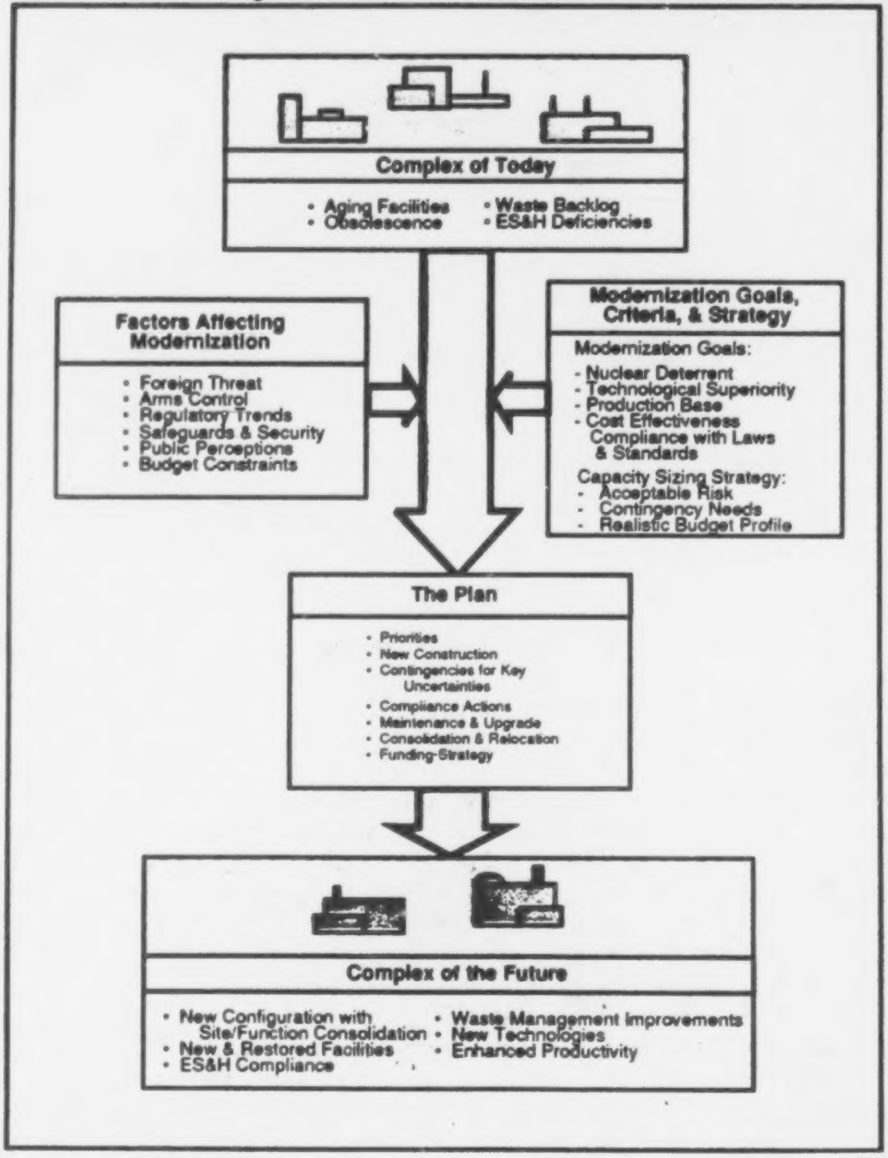
These are the plants around the country. There are 15 major sites. There are four major program elements that are part of the complex.

There are three laboratories and the Nevada Test Site involved in the research, development, and testing program. The nuclear weapons production sites are at Kansas City, at Mound, in Ohio, at the Pantex plant, at the Pinellas plant in Florida, at Rocky Flats plant in Colorado, at the Y-12 plant, Oak Ridge, TN and at part of the Savannah River facility.

Nuclear materials production sites are at Savannah River, at Hanford, the Feed Materials Productions Center at Fernald, OH, and at the Idaho National Engineering Laboratory (INEL).

Defense waste facilities are located at the Waste Isolation Pilot plant in New Mexico and at Hanford, INEL and the Savannah River plant. This was the point of departure, to take this complex today, take the nuclear weapons requirements, as projected by the Department of Defense and transmitted to the Department of Energy by the Nuclear Weapons Council, and plan on how to get to the nuclear weapons complex needed by the year 2010 and in the next century.

Development of Modernization


Complex of Today
• Aging Facilities
• Obsolescence
• Waste Backlog
• ES&H Deficiencies
Factors Affecting Modernization
• Foreign Threat
• Arms Control
• Regulatory Trends
• Safeguards & Security
• Public Perceptions
• Budget Constraints
Modernization Goals, Criteria, & Strategy
Modernization Goals:
- Nuclear Deterrent
- Technological Superiority
- Production Base
- Cost Effectiveness
Compliance with Laws & Standards
Capacity Sizing Strategy:
- Acceptable Risk
- Contingency Needs
- Realistic Budget Profile
The Plan
• Priorities
• New Construction
• Contingencies for Key Uncertainties
• Compliance Actions
• Maintenance & Upgrade
• Consolidation & Relocation
• Funding-Strategy
Complex of the Future
• New Configuration with Site/Function Consolidation
• New & Restored Facilities
• ES&H Compliance
• Waste Management Improvements
• New Technologies
• Enhanced Productivity

The strategy used was to look at what we had today and at the factors affecting modernization. Arms control was a factor.

However, Senator Kennedy, if I may just continue here, the guidance given to the Modernization Task force was to look at treaties in force and treaties that were expected to be in force, such as the Threshold Test Ban Treaty and the INF Treaty at the time, but that we would not look at treaties such as START. This is because it was thought that that would be presumptuous on the part of the Department and limit the prerogatives of both the executive branch and the congressional branch of Government.

So, we looked only at existing arms control treaties, not those that were under discussion.

Senator **Kennedy**. If I may interrupt on this point. In March 1988, Senator Wirth and I asked the Department whether arms control requirements would be among the criteria used to address the various scenarios the modernization study would consider. DOE responded that it was examining several options for long-term configuration of the nuclear weapons complex, including among the options, a response to modified force structures, aligned with agreements reached in the treaty negotiations.

The request that both Senator Wirth and I made to the Department at that time was to consider the range of options, consistent with what the existing administration had proposed, and what the impact would be in terms of the whole complex.

At least it was certainly my understanding, and I believe Senator Wirth's as well, that, consistent with what the administration had been proposing, we were going to be able to have some idea as to what a successful negotiation would mean in terms of this plan.

I think that was certainly the impression that was left with Senator Wirth and me.

Mr. **Wade**. Senator Kennedy, we did indeed look at all of the options presented by the various arms control initiatives that had been under discussion. In order to try and present to this committee and to House Armed Services some sort of median point from which one could easily deviate either way, we chose, as a matter of direction to the Modernization Task Force, to say use only those arms control agreements which are in effect.

Now, the direction to the President from this committee and the direction to us from the President, is to develop as a next step an implementation plan. Certainly, as there are continued arms control initiatives, this plan can be and will be modified to meet those.

Senator **Kennedy**. Just one more point and I'll let you go ahead.

Who made that judgment? Who made that determination, in what department?

Mr. **Wade**. The Department of Energy, sir.

Senator **Kennedy**. Where? I want us to get some idea of who was making that decision, to try to find out, at least, who has the responsibility for making the judgment, as you referred to it.

There was clearly an impression, I think, both by Senator Wirth and myself, that the study would cover where the administration is going and what the implications would be. Obviously, that was not the understanding of those who did the study. I'd just like to find out where the authority was, who made the judgment, the decision, to cut it that way, as you have described.

Mr. **Wade**. This whole effort, Senator, has been guided by a steering committee, which was chaired by Joseph Salgado, then Deputy Secretary of the Department of Energy. There was membership on that committee from the Department of Defense, from OSD, and from the Joint Chiefs. There was also a member from the National Security Council. I was a member for the Department of Energy.

It was that steering committee that came up with the statement that I just made to you.

Senator **Kennedy**. All right.

I won't take everyone's time right now, but perhaps you could indicate for the record who is on that committee.

Mr. **Wade**. I would be pleased to do that.

Senator **Kennedy**. Thank you.

[The information follows:]

Members of the Steering Committee of the Nuclear Weapons Complex Modernization Study:

Joseph F. Salgado, Deputy Secretary, Department of Energy, committee chairman.

Troy E. Wade II, Acting Assistant Secretary for Defense Programs, Department of Energy.

Ernest C. Baynard III, Assistant Secretary for Environment, Safety, and Health, Department of Energy.

Robert B. Barker, Assistant to the Secretary of Defense for Atomic Energy, Department of Defense.

Linton F. Brooks, Director of Defense Programs and Arms Control, National Security Council.

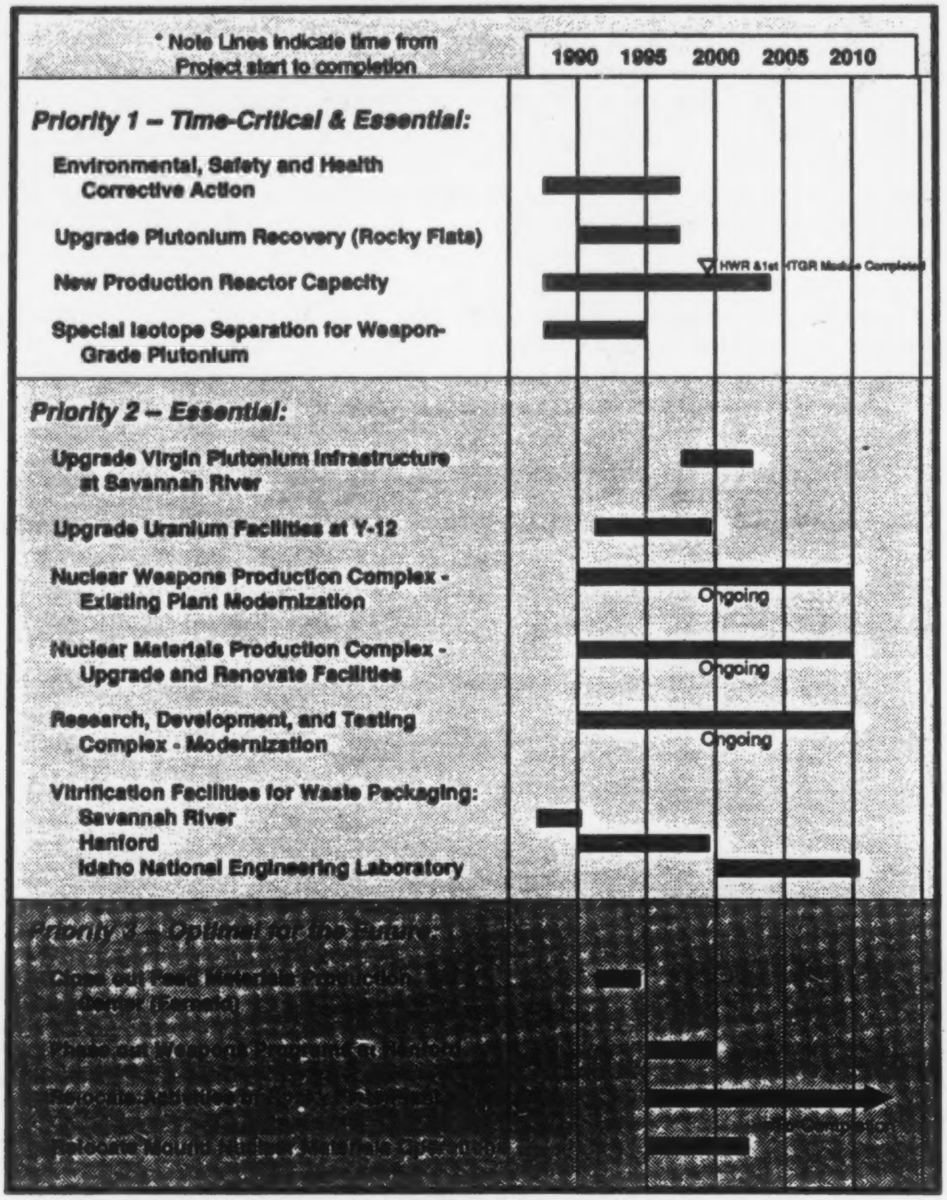
Phillip R. Olson, Deputy Director for Strategy and Policy, Joint Chiefs of Staff.

Mr. **Wade**. We took the factors affecting modernization. Goals and strategies are to protect the nuclear deterrent and look at capacity. Capacity is an important consideration in all of this.

If you look at the complex that I described on the previous slide, the modernization study will point out to you that slightly better than two-thirds of the budget that goes to support those plants shown on the previous slide are to maintain the capacity needed to provide the nuclear weapons that this Nation has asked for.

So we took the capacity requirement and put together a plan and came up, as you see at the bottom there, with what we call the complex of the future. It is smaller. It does include both some geographical and plant consolidations, some new technologies, and all in compliance with existing environmental laws.

Priority of Key Modernization Activities



These are the key priorities that came out of the modernization study. They were divided into priorities one, two, and three. Priority one consists of those actions that were deemed to be time critical and essential to current operations.

The first of those are those actions which are necessary to bring the current complex into compliance with existing environmental laws. Second is to upgrade the plutonium recovery capacity at the Rocky Flats plant, Building 371.

Third is new production reactor capacity, which included both the heavy water reactor at Savannah River and a four module high temperature gas reactor at the Idaho National Engineering Laboratory and fourth is the Special Isotope Separation Plant at INEL.

Those were considered to be the priority number one activities.

You see priority number two and priority number three there. I might point out in priority number two, those considered essential, the categories that say existing plant modernization. What that means is that we would propose to invest annually 4 percent of the replacement value of those plants back into the plants. The average nationally for U.S. industry is somewhere between 4 percent and 7 percent.

If you look historically at what we have invested in the nuclear weapons complex, you will find it is 2 percent or less, which is one of the reasons we have gotten into the fix that we are in today—aged facilities with not a prudent investment of the replacement value.

Finally, priority number three, options for the future for which we need the concurrence and consultation of this committee, is to close out the Feed Materials Production Center (FMPC) in Fernald, OH, by relocating those activities to some other Federal site, or to commercially buy the material that we now produce at that site.

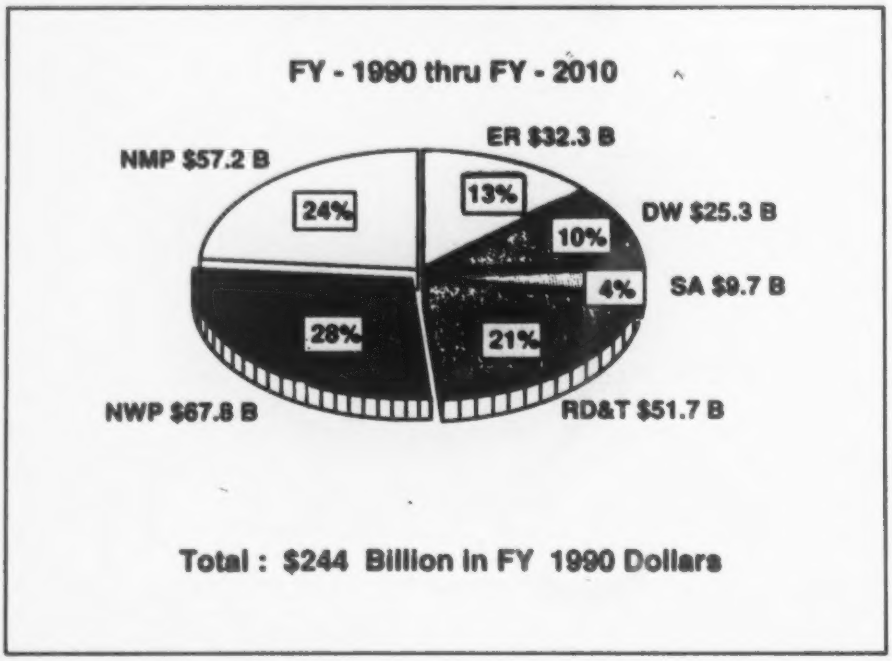
Also there is a phase out of weapons production programs at the Hanford site. As you know, the Department made a decision to put N reactor at Hanford on cold standby. What this would provide for is the separation of the plutonium from the material that is still stored at Hanford and then close out the plutonium processing facilities at Hanford and continue waste and environmental activities there.

We propose that consideration be given to the relocation of the Rocky Flats plant to some more remote location. Rocky Flats, when it was built 30-some years ago, was then considered a remote site, as was the case with the operations at Mound Laboratories.

We are really looking at moving hazardous material operations from sites where population encroachment is a problem or will become a problem.

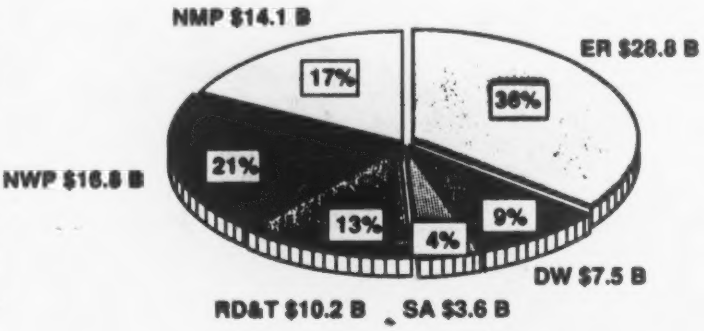
So, you see here the priority one, two, and three activities, as outlined in the modernization study, and the time lines associated therein.

Total DP Funding



The funding for accomplishing all of this is, as you pointed out, Mr. Chairman, $244 billion in fiscal year 1990 dollars. Now, that is broken into the categories that you see in this pie chart: nuclear materials production, nuclear weapons production, environmental restoration, defense waste, security affairs, and research, development, and testing. That is the total cost for operating the facilities, doing the modernization, and doing a portion of the environmental restoration associated with those organization activities.

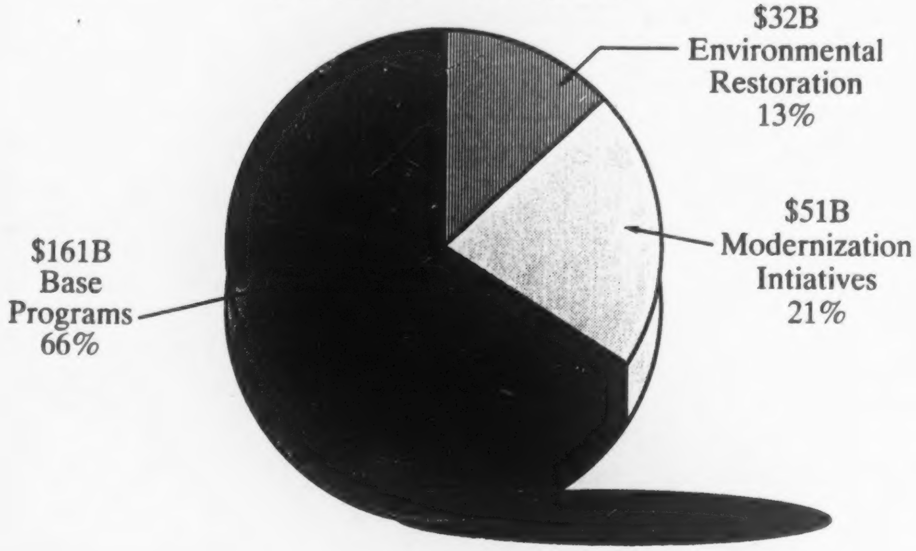
FY 1990 - FY 2010 Cumulative Increase Over Funding at FY 1989 Level



Total : $81 Billion in FY 1990 Dollars for FY 1990 thru FY 2010

The cumulative increase necessary over funding at the 1989 level—in other words, the amount of money needed over what it was going to take just to operate the facilities for this 21-year period—is roughly $81 billion, of which $52 billion is for modernization activities, and $29 billion is for environment safety and health, environmental restoration activities.

$244 B
Defense Program Resource Plan
FY1990 - FY2010



That is shown on this next chart—$161 billion for the base programs, which is 66 percent of that $244 billion; $51.9 billion for modernization initiatives; and, when you take the environmental compliance, environmental restoration number, in the 1989 budget, escalated, as has been agreed within the Department to grow to $1 billion in 1995, and $2 billion in the year 2000, you come up with $32 billion over the 21 years.

So, looking at the $244 billion, it's $161 billion for base programs, $32 billion for environmental restoration, and $51 billion for modernization.

Senator EXON. Is that particular graph in our material here?

Mr. WADE. The numbers are on page 14 of my testimony. There is a table that has that information.

The modernization report itself, Senator, does not have this particular chart.

Senator EXON. Well, it's not in our papers here.

Mr. WADE. No, sir.

Senator EXON. I followed the other two graphs, but that one is not in here. Is that right?

Mr. WADE. And that's our error. It should have been, since I was going to use it.

Senator GLENN. May I ask just one question here?

The $244 billion I had always understood covered everything we knew about. But what you just said a minute ago is that the $244 billion does not cover all of the environmental restoration.

Is that correct?

Mr. WADE. It covers environmental restoration through the year 2010, Senator. That is where we stopped.

Now, in the December report—and Mr. Berube will discuss the December report in a little bit—those are carried out beyond the year 2010. But we stopped our projections at 21 years.

Senator **Exon**. Which is another way of saying there is likely to be some more. Isn't that right?

Mr. **Wade**. Yes, it will be higher.

Senator **Glenn**. So it's going to continue right on out beyond 30 years.

Modernization Initiatives

Upgrade Bldg. 371	$ .4
Two NPR's	8.0
SIS	.8
Upgrade Virgin PU Infrastructure	.2
Modernize Uranium Fac., Y-12	2.1
Relocate RFP	3.3
Relocate Mound Nuclear Mat. Operation	.2
Transition cost for above two	1.2
Upgrades:	
RD&T Complex	10.5
NWP Complex	11.0
NMP Complex	13.4
	$51.1B

Mr. **Wade**. I will move very quickly now through modernization initiatives.

The upgrade of Building 371 at Rocky Flats, which is needed to recover plutonium that is chemically very difficult to separate at the moment, is a prudent investment and needed, even though there is a recommendation to look at moving the plant. Moving Rocky Flats is an operation that will take close to two decades.

So this is an initiative that is needed, not only to recover the plutonium that we cannot now recover, but to provide for cleanup, decontaminating, and decommissioning of Rocky Flats if the decision is made to move it.

You see there the two new production reactors; also $800 million for the Special Isotope Separation plant; upgrading the virgin plutonium infrastructure at Savannah River means the rehabilitation of one of the two existing processing canyons at Savannah River; modernize both the depleted and the highly enriched uranium facilities at the Y-12 plant at Oak Ridge, TN; relocate the Rocky Flats plant; relocate the nuclear materials operations at Mound Laboratories; and then, as I mentioned earlier, upgrades in RD&T, NWP, nuclear weapons and nuclear materials complexes. That is the 4 percent reinvestment.

Base Programs

Strengthen RD&T	$ 41.2
Arms Control Initiatives	8.8
Modernize, Maintain and Evaluate Stockpile	
HEU Procurement	5.9
NMP Operations	28.9
NWP Operations	49.7
Waste Fee	2.7
Waste Vitrification Facilities	1.9
Disposal, Storage, Processing Waste	15.4
Capital Investment, Waste	5.3
Security Investigations	.9
	$160.7B

This is what is in the $161 billion that is needed to operate those facilities over the 21-year period. There is $41 billion in the research, development and testing program—that is the three national laboratories and the Nevada Test Site; arms control initiatives, $8.8 billion; to modernize and maintain the existing stockpile will require an investment of $5.9 billion for new highly enriched uranium; $28.9 billion for nuclear materials production operations; and $49.7 billion for nuclear weapons production operations. You see here for the first time $2.7 billion, which is Defense Programs' contribution to the commerical waste repository. This fee is our portion of the overall repository fee based on the volume of high level defense waste that will go into the commerical repository.

There are waste vitrification facilities, and so on. Security investigations over that 21-year period are included.

Environmental Restoration

Environmental Cleanup	$27.2
Decontamination/Decommissioning	5.1
	$32.3B

**ES&H Crosscut of $25B included within Modernization and Base Program*

ES&H Ongoing Program	$13.5
ES&H Corrective Actions	11.1
	$24.6B

Environmental restoration is shown here. Environmental cleanup is $27.2 billion; decontamination and decommissioning of those facilities is $5.1 billion, for a total of $32 billion.

Senator Glenn, that does stop at the year 2010. I would like to point out, though, that, within the $161 billion of operating and as part of what I call the 4 percent reinvestment of the replacement value to maintain compliance with current environmental standards, to take corrective actions necessary to bring existing facilities into compliance, you have another $25 billion.

So, over the 21-year period, the investment would really be $32 billion plus $24 billion in activities associated with environment, safety, and health activities.

So it is a significant portion of the $244 billion.

NUCLEAR MATERIALS PRODUCTION PROGRAM

RECOMMENDATIONS

- Complete (ASAP) essential safety and other improvements to existing SRP reactors
- Construct two new production reactors at two sites
  - One NPR should be a modernized version of the current low-temperature, heavy-water reactor. Savannah River Plant - preferred site
  - The other NPR should be a modular, high-temperature gas-cooled reactor. Idaho National Engineering Laboratory - preferred site

In the nuclear materials production program, the recommendation is to complete quickly the essential safety improvements necessary, and this was the subject of this morning's hearing; to assure the safe and continued operation of the existing Savannah River reactors over the next decade; and, second, to construct new production reactor capacity, specifically two new production reactors of two different technologies at two different sites.

NUCLEAR MATERIALS PRODUCTION PROGRAM
(Con't)

RECOMMENDATIONS

- Construct a Special Isotope Separation (SIS) plant to convert DOE inventories of fuel-grade plutonium into WG plutonium
- Upgrade and renovate essential existing facilities to meet modernization objectives. A continuing investment of about four percent per year of the facilities' replacement value will be needed
- Complete the processing of onsite N-Reactor fuel and plutonium through PUREX Plant and the Plutonium Finishing Plant within four to five years followed by the phase out of all NMP facilities. Continue waste management operations

In the nuclear materials production area, DOE will be continuing to construct a Special Isotope Separation plant in Idaho, to convert very large inventories of DOE fuel grade plutonium into weapons grade plutonium at a substantial economic saving over new plutonium generated in reactors; and a facility which would provide this Nation, again, the capacity issue, with its only source of plutonium for the decade of the 1990s.

In the middle, to upgrade the facilities, as I mentioned.

The last bullet is the Hanford recommendation, to complete the processing of fuel generated at N reactor in the Purex plant and then phase out the Purex and the plutonium finishing plant.

NUCLEAR MATERIALS PRODUCTION PROGRAM

(Con't)

RECOMMENDATIONS

- Close out the FMPC facilities in the near term (early 1990s). Consideration given to preproduction of depleted uranium materials for NMP program. Any remaining tasks should either be relocated to another DOE site or contracted with a commercial vendor
- Modernize the plutonium infrastructure at SRP
- HEU
  - Continue to supply Navy's requirements
  - Plan for $3 billion purchase of oralloy

Continuing with nuclear materials, there is a recommendation to close out the FMPC facilities at Fernald in the early 1990s, with consideration given to preproduction of materials that we might need in later years; also, looking for alternate sources for that material, either Federal or commercial; another recommendation is to modernize the plutonium infrastructure at the Savannah River plant. That is what I mentioned earlier, the upgrade of one of the existing canyons. Also there is the requirement to buy new, highly enriched uranium for both the Navy's requirements and nuclear weapons requirements.

NUCLEAR WEAPONS PRODUCTION PROGRAM

RECOMMENDATIONS

- Provide a continuing annual investment of about four percent of the facilities replacement value to modernize the NWP Complex to maintain production capability and achieve increased efficiencies
- Upgrade existing plutonium facilities at RFP
- Initiate the relocation of RFP activities in the next decade
- Nuclear materials activities should be transferred from Mound to other existing DOE facilities

As you can see in the nuclear weapon production complex are recommendations to: invest the 4 percent; upgrade the existing plutonium facilities, Building 371 at Rocky Flats plant, leading to the movement, the relocation of that whole facility, if that be the decision; and, finally, the last bullet is transfer nuclear materials activities from Mound and other places as well—Livermore and the GE plant in Florida, where the population has come close to the boundaries of the plants.

RESEARCH, DEVELOPMENT, AND TESTING PROGRAM

RECOMMENDATIONS

- Continue to provide the technology base to maintain and modernize the stockpile
- Pursue a vigorous program to provide future weapons technology options and to guard against technological surprise
- Augment and restructure the nuclear test program to a level to adequately respond to the challenges facing the RD&T program in the future
- Provide a level of at about four percent of the RD&T equipment and facilities replacement value per year

These are the recommendations for the RD&T program: continue to provide the technology base—and that's the key to the RD&T program, the technology base—to maintain and modernize the stockpile; to pursue future weapons and technology options to guard against surprise; to restructure the nuclear test program; and to make the same 4 percent reinvestment in the RD&T facilities that we propose elsewhere in the complex.

RESEARCH, DEVELOPMENT, AND TESTING PROGRAM
(Con't)

RECOMMENDATIONS

- Future mission assignments should minimize nuclear material operations at LLNL
- Expand the V&CT program consistent with the requirements of Arms Control activities

Here, again, we say that future assignments at Livermore should minimize the handling of nuclear materials, and we should greatly expand the verification activities of the DOE, consistent with the requirements of arms control activities of the Government.

DEFENSE WASTE MANAGEMENT PROGRAM

RECOMMENDATIONS

- Increase the waste management budget (including the amortization of the waste fee) from the current level of $814 million to about $1.25 billion in the early 1990s to facilitate the transition from interim storage to permanent disposal and level funding thereafter
- Initiate a modern and aggressive waste minimization program to reduce future waste generation and waste backlogs
- Continue to implement a waste management program that includes the use of the WIPP: in 1989; SRP, DWPF in 1990; the HWVF in 1999; and the Idaho Waste Immobilization Facility in about 2010

In defense waste, there is a recommendation to increase the waste management budget from the current level to over $1 billion in the 1990s, as we move from the R&D situation at the Waste Isolation Pilot plant to a permanent repository; to initiate major R&D programs to cut down the waste streams coming from our facilities, cut down the waste backlogs; and to begin to operate the vitrification plant at Savannah River. The vitrification plant to handle the high level waste at Hanford is already an authorized facility, and we would proceed with that coming on line in 1999; and to plan for the vitrification facility in Idaho, to come on line about the year 2010.

ENVIRONMENT, SAFETY, AND HEALTH PROGRAM

RECOMMENDATIONS

- Increase the level of funding in the near term (base program and corrective actions) to successfully complete all actions needed to ensure production

As I mentioned, the thread through all of these things is to increase the level of funding necessary to assure that existing facilities, those that we are operating today, are in compliance.

TRANSITION ACTIVITIES

- Establish a tritium reserve using all three SRP reactors
- Conduct advanced planning and preparation for an interim tritium production capability
- Recycle and recover plutonium from retired weapons and backlog scrap and process plutonium from existing spent fuel and other inventories
- Maintain a highly enriched uranium capability to meet Navy and Defense Program needs
- Increase resource requirements for Environmental Restoration

Transition activities recommended by the modernization study include: establishing a tritium reserve by overproducing tritium when we get the three Savannah River reactors back on line; to plan for an interim tritium production capability; to go in and recycle and recover all plutonium available from both retired weapons and from both the chemically difficult and isotopically difficult scrap that now contains plutonium; to maintain a highly enriched uranium capability necessary to meet Navy and DOD requirements; and, once again, to increase the resource requirements for environmental restoration.

HIGHLIGHTS

- **Nuclear Arms Control initiatives under consideration do not eliminate the need for nuclear deterrence**
- **The Nuclear Weapons Complex must be modernized in order that nuclear deterrence can continue to be a principal element of the Nation's security posture**
- **The Nuclear Weapons stockpile does not exist in a static state but requires modernization to meet changing threats and to enhance the safety and operational characteristics of the weapons**
- **Modernizing the Complex will provide increased productivity and efficiency which will over time result in cost savings through consolidations and replacement of worn-out facilities which require significant maintenance and upgrading actions**
- **The cost of modernization and environmental restoration will require a significant increase in funding for the next several decades**

The highlights of the report say that the arms control initiatives under consideration do not eliminate the need for nuclear deterrence. So, we were looking at the capacity issue, taking what was thought to be the nuclear weapons stockpile in the year 2010, modernizing it, taking into account the fact that the weapons stockpile does not exist in a static state, but changes all the time. We need the modernized complex.

MODERNIZATION IMPLEMENTATION PLAN

- **Review existing management plans for consistency and conformance with DOE guidelines**
- **Develop overall management plan outline and remaining individual management plans for new initiatives**
- **Outline management process to include:**
  - **Schedule of actions**
  - **Management review process**
  - **Compliance review process**
  - **Technical review process**
  - **External coordination process**
  - **Gross funding requirements**

Finally, we have begun moving toward the next step, which is the implementation plan—to look at existing plans, such as those associated with the upgrade of Building 371 at Rocky Flats, with the upgrade of the canyons at Savannah River to see what's there, what we need to do, and, ultimately, to come up with a management process to include the actions necessary to move toward adaptation of this modernization plan, should that be the agreement reached between the Department of Energy and these committees.

Mr. Chairman, that completes a very quick summary. Mr. Berube would now like to make his comments about the environmental portion of this.

[The prepared statement of Mr. Wade follows:]

STATEMENT OF
TROY E. WADE II
ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS
U.S. DEPARTMENT OF ENERGY

Mr. Chairman and members of the committee, I appreciate the opportunity to testify on the study concerning the modernization of the Department of Energy's (DOE's) nuclear weapons complex. I am accompanied today by Ray Berube, Acting Assistant Secretary for Environment, Safety, and Health.

The results of the study and a modernization plan have been incorporated in the President's Report to the Congress as directed by section 3132 of Public Law 100-180. The President's Report was provided to the Senate Armed Services Committee on January 12, 1989. I would ask that the unclassified report be made a part of the record.

The major assumption in the modernization plan is that nuclear weapons will continue to be relied on to assure national security for the foreseeable future. The nuclear weapons complex (complex) of the DOE provides the nuclear weapons that support the nuclear deterrent policy. Providing nuclear weapons includes the production of nuclear material; design and manufacture of nuclear weapons; surveillance and maintenance of nuclear weapons in the stockpile; research, development, and testing of nuclear devices; and modernization of the nuclear weapons stockpile.

Much of the complex was constructed more than 30 years ago. Some facilities are experiencing operational problems due to obsolete equipment, evolving operational systems, and the Department's commitment to comply with applicable federal and state environmental, safety, and health standards and requirements. Many facilities are approaching the end of their useful lives. For example, the existing production reactors, at their current power limits, have limited operational capability. All three reactors at the Savannah River Plant are shut down for safety system improvements and are not expected to be fully operational before late 1989 and N Reactor in Hanford is in cold standby. In spite of the improvements that have or will be made and in spite of the increasingly extensive maintenance they are undergoing, it is possible that the reactors may not be able to achieve acceptable production efficiencies. Other elements of the complex soon may be in a similar situation.

The complex is organized into four major mission-oriented, programmatic elements described as follows:

- Research, Development, and Testing (RD&T) - The RD&T complex certifies the reliability and safety of the current stockpile; designs and tests nuclear weapons; conducts exploratory research to avoid technological surprise and to provide future weapon design options; and supports national arms control objectives.

  The Verification and Control Technology (V&CT) program, which is carried out by the RD&T complex and others, coordinates the formulation and development of DOE positions relating to arms control initiatives and fulfills DOE responsibilities in energy, nuclear weapons, and treaty-related intelligence.

- Nuclear Materials Production (NMP) - The NMP element supplies nuclear materials (i.e., tritium, weapon-grade [WG] plutonium, and highly enriched uranium [HEU] for nuclear weapons. Nuclear materials for stockpiled weapons are supplied by a combination of: (1) recycle and recovery of material that has been in the stockpile; and (2) production of new materials in DOE nuclear production reactors and uranium enrichment facilities.

- Nuclear Weapons Production (NWP) - The NWP element maintains and evaluates the Nation's nuclear weapons stockpile for continued reliability and existence in a modern state of operational readiness; manufactures, modifies, and retires nuclear weapons; assures that nuclear weapons meet rigid quality and safety standards; and transports nuclear weapons and major components among DOE and to Department of Defense (DoD) locations.

- Defense Waste Management - The Defense Waste Management Program includes programs for waste management and environmental restoration. The Waste Program provides treatment, storage, and disposal of radioactive and mixed waste (radioactive waste mixed with nonradioactive hazardous waste) generated during the production of weapons, components, and nuclear materials, and during processing of nuclear materials. The Environmental Restoration Program includes activities to clean up environmental contamination and to decontaminate and decommission (D&D) inactive facilities in the complex.

Figure 1 relates these program elements with the 15 major sites in the complex.

Figure 1

Nuclear Weapons Complex

Mission: Maintain, certify reliability, and modernize the nuclear weapons stockpile based upon DoD Requirements. Maintain superiority in nuclear weapons technology.

LABORATORIES/TEST SITES

Los Alamos National Lab.
Lawrence Livermore National Lab.
Sandia National Lab.
Nevada Test Site

MISSION:
Certify reliability and safety of stockpile. Design and test nuclear weapons. Conduct exploratory research to avoid technological surprise, advance designs, and support National Arms Control objectives.

NUCLEAR WEAPONS PRODUCTION COMPLEX

Kansas City Plant
Mound Plant
Pantex Plant
Pinellas Plant
Rocky Flats Plant
Y-12 Plant
Savannah River Weapons Facility

MISSION:
Manage program to maintain and manufacture, modify, evaluate, stockpile, and retire nuclear weapons to meet the Nation's deterrent requirements. Transport nuclear weapons and major components between DOE and DoD locations.

NUCLEAR MATERIALS PRODUCTION COMPLEX

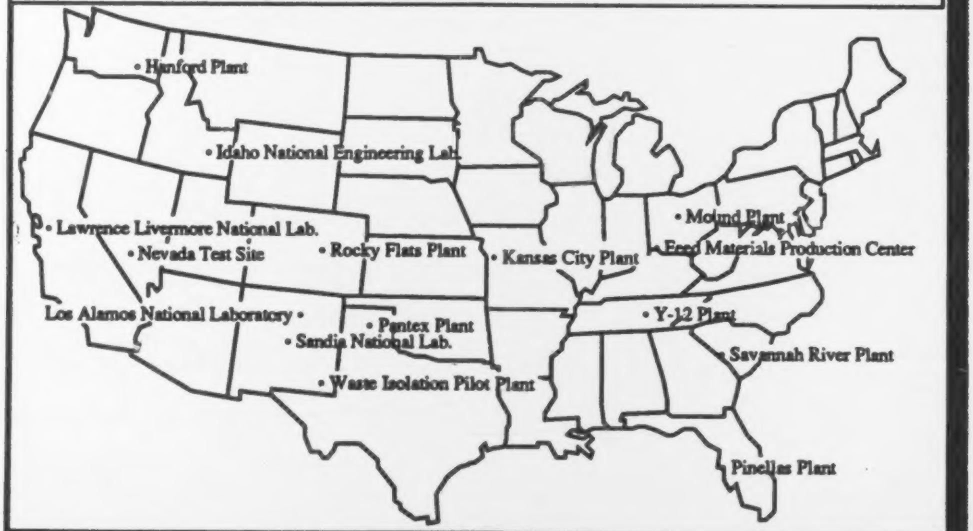
Savannah River Plant
Hanford Plant
Feed Materials Production Center
Idaho National Engineering Lab.
Y-12 Plant

MISSION:
Supply essential nuclear materials: tritium, weapons-grade plutonium, and highly enriched uranium through a combination of recycle and recovery of material from retired stockpile weapons and production of new material in nuclear reactor and uranium enrichment facilities.

DEFENSE WASTE COMPLEX

Waste Isolation Pilot Plant
Hanford Plant
Idaho National Engineering Laboratory
Savannah River Plant

Mission: Provide safe processing, storage, and disposal of radioactive and mixed waste generated during the production of weapons, components and by-products of nuclear materials and during processing of nuclear materials.


• Hanford Plant
• Idaho National Engineering Lab.
• Lawrence Livermore National Lab.
• Nevada Test Site
• Rocky Flats Plant
• Kansas City Plant
• Mound Plant
• Feed Materials Production Center
Los Alamos National Laboratory •
• Pantex Plant
• Sandia National Lab.
• Y-12 Plant
• Savannah River Plant
• Waste Isolation Pilot Plant
Pinellas Plant

Incorporated within these four major programs are supporting programs that affect all of the sites, facilities, and operations: (1) Safeguards and Security (S&S); and (2) Environment, Safety, and Health (ES&H) in support of the ongoing mission. These two program activities have been commonly classified as "cross-cut" activities.

The entire complex will require extensive modernization over the next 15-20 years to meet its obligations well into the next century. The principal needs for modernizing the complex are:

- Meeting the nation's requirements for a modern nuclear weapons stockpile;
- Complying with environmental, safety, and health requirements;
- Maintaining nuclear weapons technological superiority; and
- Providing the flexibility to adapt to changing production and technological needs with minimum impact on schedules and cost.

The factors involved in the future shape of the entire complex are:

- Nuclear Arms Control and Reductions - Significant arms control initiatives are being pursued by the Soviets and the U.S. that may provide a reduction in nuclear weapons and a concomitant reduction in the threat to the U.S. It is difficult to predict, however, the outcomes of arms control initiatives. Under most nuclear arms control scenarios, the capabilities of the complex, both technical and productive, must be maintained.

- Current Status of the complex - Maintaining the nuclear deterrence capability of the United States obviously requires the continued viability of the complex. Determining the actions and resources required for maintaining this viability begins with an assessment of its current status, particularly with the status of those facilities involved with the production, processing, and handling of nuclear materials.

A majority of the facilities at the 15 major sites in the complex were designed and built between the late 1940s and mid-1960s. These facilities reflect the strong emphasis placed on nuclear deterrence during the post-World War II period. During the early years, significant redundancy was built into the complex, especially for nuclear materials and weapons production activities. Gradually, this redundancy has been reduced because of funding considerations and the aging of the complex.

The changing requirements make it more difficult to achieve successful compliance in facilities that are 30 years or more old. The criteria to which most facilities in the complex were designed and constructed often do not meet current standards in areas such as seismic design, fire protection, and environmental releases (e.g., air emissions and hazardous waste disposal). Operating practices that once were acceptable do not comply with today's regulations and standards. Consequently, major cleanup of waste sites and upgrading of operating facilities are required. Failure to meet environmental, safety, and health requirements has already caused and could again cause the shutdown of key sites or facilities in the complex for significant periods of time.

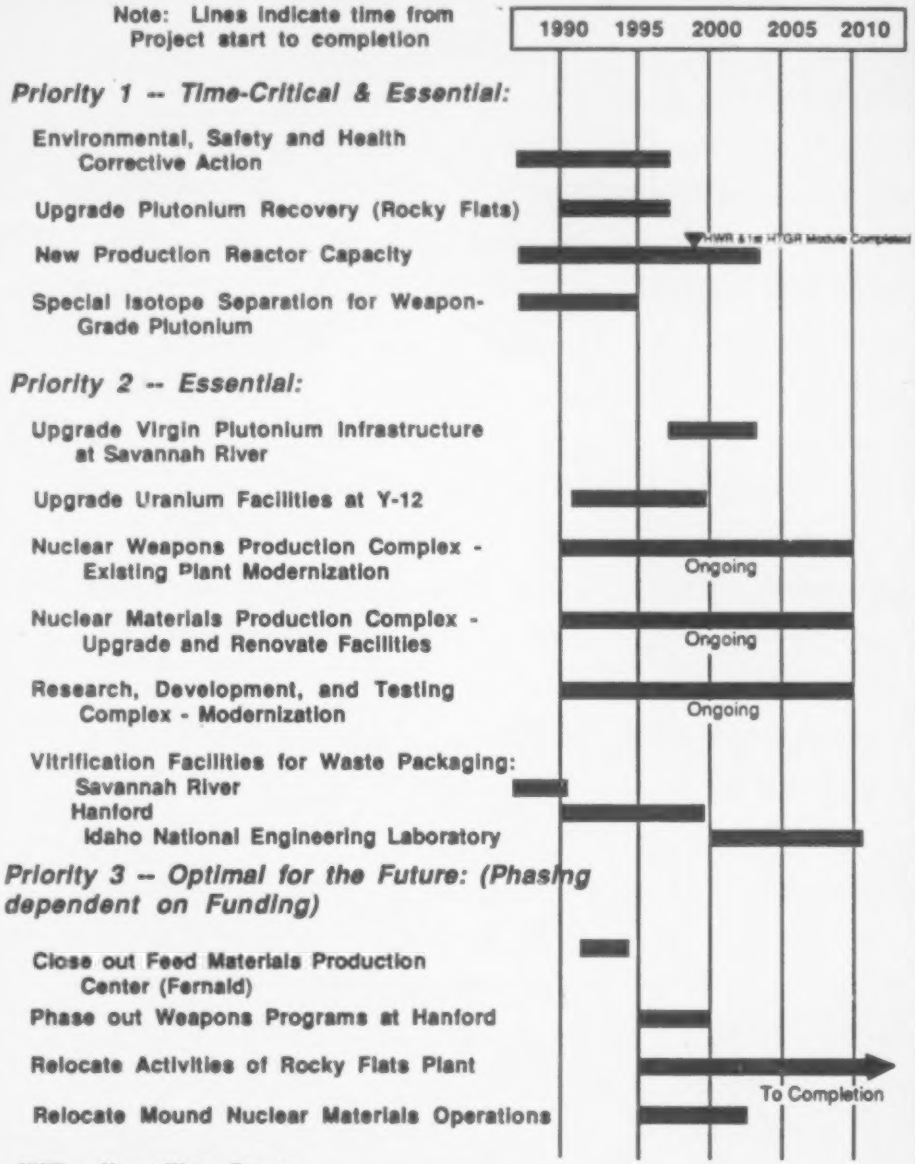
Continued operation of the complex without its extensive modernization will result in:

- Increasing risk of incidents that could have an affect upon the public and the environment and result in shutdown of a key facility;
- Steadily increasing maintenance outages, decreased productivity, and a greater risk of not meeting production requirements;
- Continued operation with piecemeal solutions to environmental, safety, and health and waste disposal problems;
- Decrease in technical competence and technological superiority; and
- Continued competition for limited funding without the discipline of overall priorities based on sound cost-benefit analysis, leading to fragmented support of programs within the Administration and Congress and, subsequently, to the inefficient use of resources.

The modernized complex will be more streamlined and cost effective with the flexibility to adapt to a broad spectrum of potential military, political, and technological futures. The resulting complex will meet all applicable federal and state standards for protection of the environment and of the safety and health of employees and the public. Those prioritized actions to achieve a modernized complex are shown in Figure 2 with corresponding implementation schedules.

As noted from Figure 2, the key modernization activities have been prioritized into three categories. The highest priority is given to those activities that are time-critical and essential. Examples in this category are activities concerning Environment, Safety, and Health (ES&H) Corrective Actions and New Production Reactor capacity. The second highest category includes those actions that are deemed essential for continued actions such as the upgrading of Savannah River Plant facilities related to processing plutonium after it comes from a reactor and the upgrading of the nuclear materials production and weapons production complexes. The third category includes those actions needed to optimize the complex for the future.

Figure 2
Priority and Schedule of Key Modernization Actions



HWR - Heavy-Water Reactor
HTGR - High-Temperature Gas Cooled Reactor

This last category will achieve more optimal conditions through closeout of certain activities in the Nuclear Materials Production complex as well as the relocations of certain activities in the nuclear weapons complex. Although not part of the modernization activities, the Department recognizes the need to address cleanup of environmental contamination, and decontamination and decommissioning (D&D) of contaminated inactive facilities. The modernization study formulated a strategy and resource plan to address these environmental restoration needs. A system is being put in place working closely with the U.S. Environmental Protection Agency and the States for dealing with environmental restoration activities which will consider risk to the employee, the public, and the environment. The funding level will be increased from the FY 1989 level of $160 million to $1 billion per year by FY 1995, to $2 billion per year by FY 2000, and remain at $2 billion per year until restoration is complete. The total expenditure to FY 2010 would be $32 billion.

In addition to the modernization actions described, other actions are being undertaken by DOE to address near-term issues. These actions are essential to ensure that supply meets demand during the transition years, and to permit a smooth transition to the modernized complex. Major activities included in this category are to:

o Complete as soon as possible essential safety and other improvements to the Savannah River Plant reactors to allow their restart, achieve acceptable reactor power levels, decrease unscheduled maintenance outage time, and to ensure continued production over the next decade. (Management controls and operating improvements are now underway; the Department will restart the reactors only when the improvements are made and verified with the assurance that they will result in safe operations).

- Establish a tritium reserve by producing tritium in the three existing SRP reactors while the new production reactor capacity is being constructed.

- Conduct advanced planning and preparation for an interim tritium production capability that could be implemented in the event of a protracted outage of the current Savannah River Plant reactors prior to operation of the first new production reactor. This includes limited preparation and continued maintenance of the N Reactor at Hanford, Washington, in cold standby, plus development and testing of high-temperature targets for light-water reactors.

- Utilize existing facilities at several sites to recycle and recover plutonium from retired weapons and backlog scrap and process plutonium from existing spent fuel and other inventories.

- Increase resource requirements for environmental cleanup and decontamination and decommissioning. Thereafter, environmental cleanup resources remain at that level or increase as required for safe operations.

To put all these activities in place will necessitate the dedication of substantial funds. It is estimated that $244 billion, in FY 1990 dollars, will be required to continue with programmatic requirements, modernize the complex, and make a significant investment in environmental restoration during the

FY 1990 - FY 2010 period. The total funding level broken down into Defense Programs elements is shown in Figure 3.

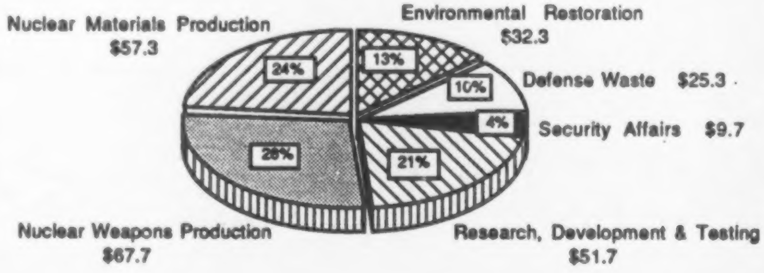
Incremental funding for various categories of Defense Programs activities is shown in Table 1 and further identified graphically in Figure 4. The base program has been defined as the appropriation for FY 1989 extended over the period through FY 2010.

The actions and funding levels required to modernize the complex are based on a stockpile framework (provided by the Nuclear Weapons Council) which establishes criteria for defining the desired capacity and capability for the programs for the next 20 years.

Figure 3

Total DP Funding

FY - 1990 thru FY - 2010



Total : $244 Billion in FY 1990 Dollars

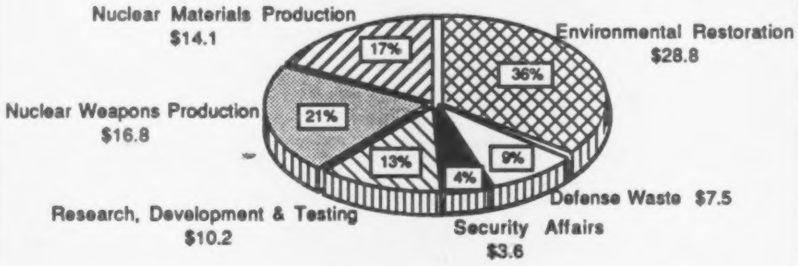
Table 1

Incremental Cost Estimates
($'s in Billions)

	FY 1989 Appropriation Times 21 years	Increment Above FY 1989 Appropriation	Total
Programmatic Requirements	$114	$21	$135
Waste Management Initiatives	18	7	25
Modernization Initiatives	28	24	52
Environmental Restoration	3	29	32
TOTALS	$163	$81	$244

Figure 4

FY 1990 - FY 2010 Cumulative Increase over Funding at FY 1989 Level



Total : $81 Billion in FY 1990 Dollars for FY 1990 thru FY 2010

In summary, the concluding highlights of the President's Plan to modernize the complex are:

- Nuclear arms control initiatives under consideration do not eliminate the need for nuclear deterrence.

- An effective and modernized nuclear weapons complex is essential if nuclear deterrence continues to be a principal element of our national security policy.

- The nuclear weapons stockpile does not exist in a static state but requires modernization to meet changing threats and to enhance the safety and operational characteristics of the weapons.

- Modernizing the complex will provide increased productivity and efficiency that will, over time, result in cost savings through consolidations and replacement of worn-out facilities that require significant maintenance and upgrading actions.

- The cost of modernization and environmental restoration will require a significant increase in funding for the next two decades.

- The approximately $52 billion expenditure above the FY 1989 appropriation level extended over the next 21 years to finance modernization will be well spent to maintain nuclear deterrence and to comply with applicable federal and state environmental, safety, and health standards.

- The approximately $29 billion above the FY 1989 level over the next 21 years required for Environmental Restoration is necessary as a result of past operations and planned relocations. This activity will continue beyond the period covered by the modernization plan until all required sites are restored.

Mr. **Berube**. Mr. Chairman, I do not have a prepared statement, but I do have some oral remarks.

Senator **Exon**. Mr. Berube, we welcome you.

Without objection, your full statement will be included for the record.

Please proceed. But first, Mr. Berube, would you please advise me about how long your statement is going to take, because we are trying to accommodate Senator Kennedy with his 3 o'clock time commitment.

Would your opening statement be at least until 3 o'clock?

Mr. **Berube**. No, sir. It should take only 5 minutes.

Senator **Exon**. What is your pleasure, Senator Kennedy?

Senator **Kennedy**. There is a joint House meeting over there at 3 o'clock that I must attend. I have just a few brief questions. Perhaps I could inquire just very briefly before we hear the next statement, if that is all right with the Chair.

Senator **Exon**. Yes.

Before you begin, Mr. Berube, let's recognize Senator Kennedy for the chairman's first 5-minute round of questions.

Senator **Kennedy**. I thank the Chair.

SOVIET UNION PLUTONIUM PRODUCTION

As I understand it, we are not in the process now of the production of plutonium. The Soviet Union now continues to produce the plutonium.

Has there been any attention paid to the possible beneficial impact of restraining the Soviet production by negotiating a verifiable cutoff in the production of fissile materials? If we are effectively closed down and they are still producing it, it would seem that, consistent with our national interests, would be to try to see if we couldn't get a verifiable termination.

What would be your reaction or response?

Mr. **Wade**. To my knowledge, Senator Kennedy, there have been no negotiations or conversations with the Soviet Union on that subject.

I think the key there is "verifiable." We are aware of the existence of large stocks of plutonium, not only in the Soviet Union, but elsewhere. I think it would be something that would be exceedingly difficult to verify, though not impossible.

Senator **Kennedy**. The point I am getting at is this. Say that Gorbachev challenged the United States to this kind of position. Would we have done the kind of analysis to be able to determine, if they said we could have verification, we are prepared to go to a moratorium? Would we have adequate analysis to be able to advise and guide the Joint Chiefs and the Senate as to what the implications would be from a national security point of view?

Mr. **Wade**. Senator, I can only give you my own personal opinion on that, certainly not a departmental position, much less an administration position.

I think that we are probably not at all prepared at this point in time to discuss a plutonium freeze as an arms control initiative because I don't think we have given enough attention to what the world's supply, as I mentioned, of plutonium is or the verification techniques that would be necessary to verify a treaty like that.

I think that is a very, very difficult thing to consider.

Senator **Kennedy**. The only point is that we are not producing it now. If we get them to halt it, I'd imagine until we are in a position even to produce it, we'd be in a somewhat better position—or would we? Even if we can't completely verify it, if they are continuing to produce it, it would seem to me if Gorbachev said, "well, we're going to have a moratorium on this"—the point I'm making is the need for development of adequate analysis in terms of such a proposal.

Maybe that won't come. Maybe it's completely unthinkable. But I am not sure that you could say definitively that it might not.

I was interested in what analysis had been done on this issue.

Mr. **Wade**. We have really done no analysis, and I think that a discussion of our production capacity versus their production capacity would really have to take place in a different forum, Senator.

TECHNOLOGY REQUIREMENTS FOR NUCLEAR WEAPONS

Senator **Kennedy**. I don't want to go beyond my time, so let me just ask you this.

In the fiscal year 1989 defense bill, I think section 1436 directs the Secretary of Energy to maintain the existing stockpile of nuclear weapons designs. As used in the 2010 Report, what does the phrase "maintaining nuclear weapons technological superiority" mean?

You know, it seems that we have been talking a good deal, even in the last 8 years, about parity and stability. In reviewing that particular section, in looking through it—and I'm not going to take the time to do so now, but I think you are probably familiar with it—why that term? What does it mean? How does it differ from what the actual text of the statute says?

Mr. **Wade**. I think it means two things, Senator.

I think it means that we must continue to provide an R&D base in our laboratories that will meet not only the technological requirements as they evolve—and they have been evolving within our own weapons programs, our own national needs—as well as understanding what our adversaries are doing and preventing technological surprise.

Senator **Kennedy**. I think you used words similar to those that are in the statute—"maintain a base of technical knowledge about nuclear weapons design and nuclear weapons effects."

I am just wondering, that's in the statute and that is what I thought was being requested. I am just wondering why the 2010 Report uses the term "superiority," whether that means just what was included in the statute or whether it had a different meaning or significance.

Mr. **Wade**. Perhaps that is our own provincial interpretation of that and nothing more.

Senator **Kennedy**. I thank the Chair very much. I want to thank the Chair for accommodating my schedule.

Senator Exon. Other Senators will have written questions that we would like to ask the witnesses to respond to as quickly as possible for the record.

I am pleased to recognize before we go back to you, Mr. Berube, Senator Thurmond.

Senator Thurmond. Thank you, Mr. Chairman.

I have to go to the floor and participate in the debate over there.

I will have some questions, if it is agreeable to you all, I will just send them to you for you to answer for the record.

Thank you very much for your appearance.

Mr. Wade. Certainly, sir.

Senator Exon. Thank you.

I would like to announce at this time, for those Senators who have to leave for other meetings, that on the floor right now, the Senate is going to debate until 4:45. Then four Cabinet appointments that have been cleared will be voted on. Rollcall votes will start at 4:45 p.m., back to back, four of them. Then, for all practical purposes, this meeting will be adjourned no later than 4:45, and, for anyone who wants to ask questions, the Chair would like for them to be so advised.

We now recognize you, Mr. Berube.

Please proceed.

STATEMENT OF RAYMOND P. BERUBE, DEPUTY ASSISTANT SECRETARY FOR ENVIRONMENT, DEPARTMENT OF ENERGY

Mr. Berube. Thank you, Mr. Chairman.

I am pleased to be here to briefly summarize some of the environmental issues facing the nuclear weapons complex within the Department of Energy.

My task will not be easy because there are many issues and they are complex. But I will do my best to provide the committee with an overall understanding of the Department's environmental problems, the principal causes of the problems, and the estimated magnitude of those problems in terms of cost and time to correct them.

I will also briefly highlight some of the efforts the Department has been making to address the problems and some related reports we have recently released.

From iy perspective, as the Department's chief environmental advocate, a position which I'd like to mention was only created in late 1985, and which I filled about 15 months ago, the Departient's probleis fall into two major categories—environmental cleanup and environmental compliance.

Environmental cleanup problems involve environmental contamination, primarily soil and groundwater contamination, at most of the sites making up the nuclear weapons complex. The contamination includes both radiological and chemical contaminants, a factor that generally makes cleanup very difficult and very expensive.

For the most part, these problems were caused by past methods used to dispose of enormous quantities of low-level radioactive waste, chemical waste, and combinations of those wastes over three to four decades of operations at the facilities in the weapons complex.

Some general examples of these waste disposal methods include shallow land burial for solid waste and direct discharge of liquid waste into surface impoundments, seepage basins, trenches, and injection wells.

In fairness to the people responsible at the time, I doubt that they realized the environmental harm that would be caused by such waste disposal methods.

How big are the contamination problems? Perhaps the best way to define the magnitude in a general, but meaningful way, is in terms of cost. Based on the best information we have today, the Department estimates that the environmental cleanup of the nuclear weapons complex will cost from $35 billion to $63 billion. And this cleanup will take a very long time. With adequate levels of funding, we believe most sites can be cleaned up in a 20-year timeframe. Some sites, however, like the Hanford site, may take twice as long.

The second major category of problems I refer to as environmental compliance problems. Simply stated, these problems involve facilities now in operation that do not comply with current environmental requirements. Most of the facilities in the nuclear weapons complex have such compliance problems. Some of these problems are due to a combination of the old age of the facilities and a failure to upgrade them over time to meet new or emerging environmental requirements.

However, the majority of the Department's most serious compliance problems involve hazardous and mixed waste management. Mixed waste, I should mention, is a term currently used to refer to mixtures of radioactive waste and hazardous waste.

For these problems within the nuclear weapons complex, the principal cause, in my view, was 10 years of legal uncertainty regarding the applicability of hazardous waste laws to waste generated at the facilities in the nuclear weapons complex.

The Department ended that legal uncertainty in May 1987 with a final rule that, in effect, subjected all such waste generated at those facilities to regulation under hazardous waste laws.

Since that time, some progress has been made in correcting what is now a very large backlog of problems. But much more remains to be done.

Of the $3 billion to $9 billion the Department estimates will be needed to bring the facilities in the nuclear weapons complex into compliance with all existing requirements, about $2 billion to $8 billion will be for correcting hazardous and mixed waste management problems and addressing future requirements, such as additional treatment and storage facilities.

In terms of time, the recently submitted modernization report envisions completion of all such corrective actions within 10 years.

Mr. Chairman, I would like now to highlight some of the efforts the Department has been making to deal with the problems just described.

First, as recently as a year ago, I would not have been able to describe the environmental problems in the weapons complex the way I just did. Although we knew there was a large legacy of environmental problems, the legacy was undefined. It was undefined in terms of cost; it was undefined in terms of time needed to fix the problems; and it was undefined in terms of priorities.

Basically, we did not have the fundamental information necessary to develop sound, long-range plans for solving that legacy of problems.

Our situation is different now. We had some help in making it different, some help from Congress, I should add. We have defined the legacy. More specifically, we have estimated the magnitude of the problems in terms of both cost and time.

These estimates were provided to Congress in the form of two reports—one submitted in response to Senator Glenn's request in July 1988, covering the nuclear weapons complex; the other was recently submitted, and it covers the entirety of the DOE complex and updates the information on the nuclear weapons complex.

We have also started to establish priorities among the environmental problems. More specifically, in December, we submitted yet another report from the Environmental Survey Program. That report was developed from comprehensive evaluations of environmental conditions at each of the sites in the Nuclear Weapons Complex, and it provides a preliminary ranking of the environmental problems at those sites. The rankings are based on potential public health risks and environmental damage.

Now that we have this fundamental information, the Department needs to translate that information into specific, long-range plans for action.

The modernization report is a first step in that direction for the nuclear weapons complex, but more specific plans will be needed. These plans should clearly provide identifiable, year-by-year milestones and schedules so that progress can be measured.

I do not want to leave the committee with the impression that pending such long-range plans, nothing is being done to address the problems. That is not the case. For example, cleanup studies are underway and progressing at all sites in the nuclear weapons complex. In addition, the Department is making determined efforts to get into place for each of the sites in the weapons complex comprehensive and enforceable cleanup and compliance agreements with EPA and the involved States.

In my judgment, these agreements are the best form of assurance that the problems will be corrected.

Mr. Chairman, I believe the Department has now made a good start at correcting its environmental problems. But we have a long, long way to go. Given sufficient funding and the time to do the job the right way, the problems can be corrected.

I would be happy to answer any questions the committee may have on departmental matters.

Thank you.

Senator EXON. Thank you, Mr. Berube. We appreciate your report. It was very interesting.

Since the Chair had previously voluntarily given his opening round of questions and his time to Senator Kennedy, that would indicate that you should be recognized at this time, Senator Gorton, for any questions that you might have.

NEW PRODUCTION REACTOR TECHNOLOGY

Senator **Gorton**. I thank you, Mr. Chairman.

I would like to direct my questions at this point to Mr. Wade.

Mr. Wade, I understand that the technical evaluations which led to this report and which included the recommendation of the construction of a heavy water reactor at Savannah River and an HTGR in Idaho originally, at the time of those technical evaluations, coupled with the Savannah River reactor, the acquisition and the completion of WNP-1 at Hanford, are a preferred way of meeting this Nation's tritium needs.

It has been said that the report was even drafted to reflect that proposal and agreed to at certain management levels within the Department, and then changed at a level higher than yours.

Is that correct?

Mr. **Wade**. Senator, there were several options included in initially looking at the new production reactor capacity question, ranging from a single reactor to multiple reactors, to the conversion of WNP-1, to looking at producing nuclear material in other governmental reactors.

The two that were finally chosen were chosen by the Secretary of Energy as a result of recommendations made to him by the Energy Research Advisory Board, that talked about heavy water being the most mature technology, but there should be another technology at another site, and it was recommended that that should be modular high temperature gas. For the purposes of then proceeding with the Environmental Impact Statement required by NEPA, those were articulated as the preferred options. As the EIS is being done, other options, including conversion of WNP-1, are still under consideration.

Senator **Gorton**. Then you are telling me that it is not correct that the technical evaluation included Savannah River and WNP-1, rather than Savannah River and an HTGR.

Mr. **Wade**. Senator, I can't answer that. I will find out and provide that to you for the record. But I can't answer that.

Senator **Gorton**. I would appreciate that.

[The information follows:]

The Secretary of Energy requested the ERAB to assess the adequacy of each of four candidate reactor technologies (Low Temperature Heavy Water Reactor, Light Water Reactor, High Temperature Gas-Cooled Reactor, and Liquid Metal Reactor) to meet the criteria for new production reactor capacity. The ERAB's technical evaluation was summarized as follows:

"The Heavy Water Reactor has the most mature U.S. technology for tritium production at the present time. The other reactor types require varying degrees of research, development, and qualification testing of the lithium target technology to make tritium, with the High Temperature Gas-Cooled Reactor target technology being the most advanced. The LWR has the most mature and widely used reactor technology for power production."

In conjunction with the ERAB assessment, the Department evaluated 18 nuclear materials production options. These options included single and multiple reactor combinations encompassing all four reactor technologies evaluated by ERAB. The two reactor technologies chosen by the Secretary of Energy were consistent with the ERAB assessment.

NEW PRODUCTION REACTOR COST AND SCHEDULE

Senator **Gorton**. How confident were you when you placed those charts on the wall, of the ability of the Department, facing all of the hazards of litigation and the like that it will face in this connection, to complete two new production reactors on the schedule that you outlined there, that is to say, early during the next century, and for a total cost of $8 billion?

Mr. **Wade**. What I am going to do, Senator Gorton, is defer to Mr. Cochran, who is Director of the Office of New Production Reactors. It is his responsibility for the schedule that you saw reflected in my chart.

So, with your permission, I will ask Mr. Cochran to respond.

Mr. **Cochran**. Thank you, Troy.

If you would, sir, could you please repeat the question, to make sure that I have it clearly, and I will try to answer it for you.

Senator **Gorton**. I wanted the degree of your confidence in both the time schedule and the cost estimate for the construction of two new production reactors.

Mr. **Cochran**. Okay.

Both the time schedule and the cost estimates are, at this stage, preliminary. They are based on analysis of what it would take to build both modern commercial reactors and the adjustments that we feel would have to be made since these are not exactly like modern commercial reactors.

But they were looked at by a number of technical teams, both inside the Department and outside the Department. That is the consensus of the best information that we can get—that those schedules are achievable and that the costs are reasonable, based on what we know today.

The cost estimates for the heavy water reactor include a 20-percent contingency; the cost estimates for the HTGR include a 47-percent contingency.

SAVANNAH RIVER TRITIUM PRODUCTION

Senator **Gorton**. How confident are you that the present facilities at Savannah River can be safely and adequately used to produce tritium from now until the time of the completion of those new reactors?

Mr. **Cochran**. I'll have to defer that to Mr. Wade, sir.

Mr. **Wade**. I wish my confidence were higher, Senator.

As you heard this morning, the focus at Savannah River right now is on doing what is necessary to assure the safe and continued operation of the three Savannah River reactors over the next decade.

We know at the moment of no life limiting factor at Savannah River. We know of no generic problem with any of the three reactors. We know of no technical reason that we cannot operate those reactors for the next decade.

So, in view of the fact that they operate at a low temperature and a low pressure, I am confident that we will be able to get them restarted and that we will be able to keep them running until the new production capacity is on line.

WNP–1 ACQUISITION

Senator **Gorton**. Is it not true, however, that the acquisition and completion of WNP–1 could be accomplished both more rapidly and at a lower cost than the construction time and cost for a new production reactor begun from scratch?

Mr. WADE. Once the decision was clear, once all the institutional problems had been solved, in terms of acquisition of the reactor, then my memory is 6 years to completion of WNP-1.

Is that right?

Mr. COCHRAN. It looks like it. Yes.

Senator GORTON. Thank you, Mr. Chairman.

Mr. COCHRAN. Sir, could I elaborate on that for just a moment before you leave that point?

Senator GORTON. Yes.

Mr. COCHRAN. There are some technical issues that are involved also.

We do not, at present, have a suitable tritium target for a light water reactor, including WNP-1. That technology needs to be developed. We have a program in place that is consistent with developing the NEPA information, to try to achieve development of that target.

But it is a go/no-go kind of activity that must take place prior to being able to embark on a WNP-1 task.

This is in addition to the institutional problems.

Beyond that, there would be some issues about the enrichment of the fuel that would be required to make WNP-1 an efficient tritium producer. You simply could not use the fuel that was planned to be used as a commercial power reactor. It takes a significantly higher enrichment.

We would have to test out in some fashion the safety aspects of that higher enriched fuel. So, it's not just a simple matter of moving into that technology and completing the hardware, although I agree with Mr. Wade's answer on the time it would probably take to complete that hardware.

Senator GORTON. Thank you, Mr. Chairman.

Senator EXON. Thank you.

Senator Glenn.

ENVIRONMENTAL CLEANUP FUNDING

Senator GLENN. You gave up your time earlier. You go ahead and I'll wait another turn.

Senator EXON. Thank you.

Mr. Wade and Mr. Berube, can you please indicate how the fiscal year 1990 budget request supports the conclusions of the study called "Study 2010," the report that you have just been discussing?

In particular, Mr. Berube, can you explain why the budget request for environmental restoration is only $315 million, when the 2010 Report suggests that cleanup expenditures should reach $1 billion by fiscal year 1995 and $2 billion per year by fiscal year 2000?

As we all know, last year, at the initiative of the chairman, Congress increased the Environmental Restoration Fund by 50 percent. However, I recognize that the cleanup is still sorely, sorely underfunded.

Can we usefully devote greater resources to this account in fiscal year 1990? If not, why not? And what is the limiting factor?

Mr. **Berube**. That is not an easy question to answer.

Clearly, our needs exceed what is in the fiscal year 1990 budget request. However, that request involved a balancing of needs within the Department.

My focus, my interest, is on environmental compliance and environmental cleanup.

I am not in a position to balance other competing needs.

With respect to this year's level, obviously, if that figure is compared to the cost estimates that I mentioned before, it's not enough. It's too small.

However, where we are right now in the cleanup process, we are not prepared to take the stuff out of the ground. We are still doing assessment and characterization, trying to define the problems. We are not doing this any differently than EPA does in their Superfund Program.

Now, the cost estimates for that phase of the work are about $2 billion to $3 billion. That is the number that we should be comparing. But, even if you do that, the $315 million still looks small.

Senator **Exon**. Yes, you are short.

Mr. **Berube**. Now, the Department's plans are to ramp up from that level today to $1 billion in 1995, and $2 billion by the year 2000. From my perspective, I think that is a reasonable program. I just hope that we can get to those levels.

Senator **Exon**. Mr. Wade, can you maybe enlighten us further as to what projects inside the Department were deemed more important than this one along the lines of my question and the answer thereto by Mr. Berube?

Mr. **Wade**. I think there is a two-part answer to your question, Mr. Chairman.

One is that the environmental restoration line has grown substantially in the past couple of fiscal years, up to $315 million this year. Although the various sites around the country did ask for money in excess of the $315 million, that is not far from the amount of money that can be effectively and efficiently spent.

As Mr. Berube said, dealing with some of these environmental problems is a very hazardous operation, and just throwing money at them, straight-away, is not necessarily the best way to do it.

So, $315 million in the budget is not all that bad at this point in the game.

As we have said, that will need to be ramped up and is intended to be, should the Department and the Congress agree that that is the right way to go.

With regard to what other projects had higher priorities, as this committee knows, it is always difficult to do the necessary balancing act between resources that are available, the mission of defense programs, which is to produce nuclear materials and to produce nuclear weapons, to meet the requirements of the Department of Defense, and to do those in an environmentally safe and environmentally sound fashion.

We came up with what we thought was the best balance of those resources, one program to another.

Senator **Exon**. Mr. Berube, are you saying, in answer to my question, that there is no site anywhere in the United States, of all those sites that we looked at, where we could start cleanup tomorrow if we had the money to do it?

Mr. **Berube**. Across the complex, there has already been some cleanup work. But, compared to what we have ahead of us and where the large problems are, that's right. We are not ready to solve the problems in fiscal year 1990 or 1991. Those studies will take 2 or 3 years or more to do.

Senator **Exon**. Everything is a matter of priorities in Government today. Despite what your words are, I don't get the impression that either one of you think we are giving proper priority to cleaning up this mess that we have on our hands.

I think the outgoing administration overlooked this priority for a number of years. As I indicated in my question, it was this Senator who added a few dollars to the program, and we knew then it was woefully underfunded.

I just say that I hope the Bush administration is going to be much more realistic about this program than has the Reagan administration. It is a major problem.

It is so major that I would like to say that, unless we can begin to clean this up faster than we have been in the previous years, unless we begin to move ahead faster on the tritium production, it might be this Senator, if no one else, who will stand upon the floor of the U.S. Senate and say, that even with the hallowed Gramm-Rudman-Hollings mandate, we may need to spend more than asked for. This probably would be a sacrilege in some peoples' minds—and I'm a balanced budgeter myself and I would like to see it—but I think we have a most serious problem here.

We are sweeping the associated high costs under the rug because there are other things that have an appearance of being higher priority. There may be such things. If that is true, then I think we had better start coming clean with the American people and recognize that we are not doing the job.

I, for one, am going to be insisting on dealing realistically and responsibly with this issue. I think that there is enough heat being generated in the Congress from this committee and others that we are going to insist that you move faster than you have been. And we are not ready to accept these excuses that maybe we can let this go for another year or two because there are higher priorities.

I believe Senator Nunn would be next.

Chairman **Nunn**. I believe Senator Glenn was here before I was, and I would defer to him.

Senator **Exon**. Then I'm sorry.

Senator Glenn.

Senator **Glenn**. Thank you, Mr. Chairman.

I agree that the $300 million that the chairman refers to is inadequate.

What was the figure you requested when it went to OMB?

Mr. **Berube**. It is Mr. Wade's budget.

Mr. **Wade**. That is the figure that we requested of OMB for the environmental restoration line, Senator Glenn. The number was $315 million.

Senator **Glenn**. That was your original request?

Mr. **Wade**. Excuse me for a moment.

[Pause.]

I stand corrected.

Our request to OMB was for $350 million. That is what OMB gave us. Forty million of that went to Savannah River. That left $315 million for the environmental restoration line.

Senator **Glenn**. What was the $1.4 billion figure that finally came over, which included ES&H? What was the original figure you requested?

Mr. **Berube**. The $1.4 billion figure in Mr. Wade's budget is ES&H activities, base program activities, plus environmental cleanup.

OMB gave the full amount that was requested. The $354 million for environmental cleanup, that was the request. That is what OMB passed back to the Department. But then, within the Department, $40 million of that was applied to Savannah River to deal with the safety problems.

Senator **Glenn**. Was there an original higher figure you had planned to ask for within the Department before the submission to OMB?

It was my understanding that there was a considerably increased amount, way above the $1.4 billion, that was originally requested, and somewhere along the line that got chopped down?

Mr. **Berube**. I believe what you are referring to there, Senator Glenn, is that, subsequent to the fiscal year 1990 budget coming back from OMB, the Department made a supplemental 1989 request plus an appeal on the 1990 budget that did involve additional funding.

I don't have the details of that.

Senator **Glenn**. According to your presentation, the annual program spending for ES&H to the year 2010 is $24 billion. In the DOE's needs study, the base program spending for ES&H is $1.8 billion per year. That comes out to about $36 billion by 2010.

Is there a discrepancy there?

Mr. **Berube**. I think perhaps I can clarify that.

The $1.8 billion figure that was used in the December report was developed by getting year-by-year estimates from the field offices, out to the year 2010, adding those, and then dividing by the number of years to come out with an average.

Now, the fact of the matter is on the early years, the number is actually lower. If my memory serves me correctly, I believe the figure for 1990 was $1.4 billion including waste management base program activities. So there is some confusion that has been generated by using an average and not year-by-year numbers.

DUAL TECHNOLOGY FOR NEW PRODUCTION REACTORS

Senator **Glenn**. All right.

Back to something more basic.

You are requesting two new reactors. What does this assume with regard to P, K, and L, and assuming K comes on, do we still need the two new reactors? If our main concern is tritium, what is the balance you struck? If K comes on and is operating okay, or P, K, and L are all brought back on line, do we then need only one new reactor?

What is the balance among these different capabilities?

Mr. Wade. Senator, the decision that was made in the Department a year ago on the advice of its consultants was that we should pursue a two-reactor strategy, one that provided for two different technologies at two different sites. Once again, that was a decision based largely on the capacity issue. It was a decision that said what do we need to do to assure that this Nation has the capacity to assure the needed supplies of tritium and plutonium into the next decade to protect the deterrent into the next decade.

It was deemed appropriate at that time to not find ourselves in the same position in the year 2010 that we are in right now, where we have literally all of our eggs in one fragile basket at Savannah River.

Senator Glenn. This presumed, though, an additional plutonium production capacity along with the requirement for tritium.

Is that correct?

Mr. Wade. Yes.

The prime justification for the new reactors is to assure the tritium supply. Once those reactors are on line, then that provides you with the flexibility to make either tritium or plutonium.

But tritium was the justification, sir.

Senator Glenn. You get what I am driving at here.

We were concerned mainly about tritium and the plutonium stock we have is looked at as being pretty good, and if we can rework some of that, it doesn't look at all that bad. One reactor can product tritium. It could produce plutonium if we really had to have it.

If P, K, and L come back on, or just say K comes back on, even if the others do not, if we have one new reactor to guarantee this, would that not be considered adequate?

Mr. Wade. By the time new production reactor capacity is completed, Senator, the Savannah River reactors will be in excess of 40 years old. We have never believed it prudent to consider that we ought to plan to run those reactors past the turn of the century.

So, although it is not our decision, it would not be prudent, I think, for us to say in 1989 that we are going to shut down P, K, and L the minute a new reactor comes on line. The philosophy has never been to keep them running. We are not talking about constructing additional capacity. We are talking about replacement capacity.

So, I am confident the decision makers at the time, as new capacity comes on line, will shut down the old reactors. I think after 40 years that is the prudent thing to do.

Senator Glenn. My time is up.

Mr. Chairman, I wonder if there should be phasing on this, where we can go all-out to get the capacity back that we certainly must have. Then it seems to me we'll have a little better time pad for making some of the future decisions on future technologies that we might want, like the SIS in Idaho, among others. It seems to me that we would then have a little more time.

Under that scheme, the requirement would be for two new production reactors right now.

My time is up, Mr. Chairman.

Senator Exon. Well, let me pursue that for just a moment.

I am not sure that Senator Glenn's question was fully answered and I was waiting for the answer.

My understanding was that when the Department made the decision it did last year about pursuing a not exactly concurrent course, I think the basic idea was to proceed with a totally new heavy water facility at the plant in South Carolina and to begin the new technology plant in Idaho, right?

Mr. **WADE**. Yes, sir.

Senator **EXON**. Was it not then assumed that, if we had gone ahead on that course, the present facilities in South Carolina would be taken out of production when the new heavy water reactor came on board?

Mr. **COCHRAN**. Yes, sir. That is correct.

As Mr. Wade indicated, these are replacement reactors, not for additional capacity.

May I enter something into the record? We based a lot of this decision on a National Academy of Sciences Study, and I would like to quote just a couple of sentences from the National Academy report. This was in 1987.

The National Academy concluded: "The remaining useful life of the production reactors at Savannah River is likely to be equal to or shorter than the time needed to authorize, fund, design, and build new facilities to produce special nuclear materials. If the United States finds it necessary to have a reliable and safe capability for the production of strategic nuclear materials, then planning for new production reactors should be accelerated."

That was a National Academy finding and that is one of the factors driving us in our consideration to try to move the schedule as rapidly as possible so that we can do all the things that are necessary.

Senator **EXON**. And obviously the plan was then to make whatever repairs and additions that were necessary for the present reactors at Savannah River to supply tritium as best they could in the meantime?

Mr. **COCHRAN**. That's correct.

Senator **EXON**. Thank you.

Senator Nunn.

SAVANNAH RIVER CLEANUP

Chairman **NUNN**. Thank you, Mr. Chairman.

I want to ask a couple of questions about Savannah River itself, hoping you can break that out.

Really, the question is what will it cost to clean up inactive sites at Savannah River?

Mr. **BERUBE**. Our cost estimates included in the December report that we submitted to Congress range from $320 million to a high of $4.2 billion.

Chairman **NUNN**. That doesn't tell us much, does it? [Laughter.]

Mr. **BERUBE**. Well, no.

Chairman **NUNN**. Why is there such a wide gap there? That's not much of an estimate is it?

Mr. **BERUBE**. There is an awful lot of uncertainty with respect to environmental cleanup. Even in situations where we have a pretty good idea of what went into a burial ground, there could have been a lot more put into the burial ground. Even if you do a 100 percent sampling, it's only when you really get in and start cleaning it up that you are sure you have found everything.

Of course, what is there is going to determine what is required in terms of remedy. That is what drives the cost.

Chairman **NUNN**. What is the number again, the range?

Mr. **BERUBE**. It ranges from $320 million, what we call an expected value—that is what the Savannah River operations office people think that the regulators there will demand in terms of cleanup; the high end is $4 billion and $200,000.

Chairman **NUNN**. It's $4 billion and $200,000?

Mr. **BERUBE**. That's right.

Chairman **NUNN**. Who came up with the $200,000 when you have that kind of range?

Mr. **BERUBE**. I'm sorry. I misread the number. It's $4.2 billion.

Chairman **NUNN**. I see. I hate to get to the point where $200,000 isn't much money. [Laughter.]

Mr. **BERUBE**. We're not unique, I should point out, in the range of these cost estimates.

In the Superfund program, the original cost estimate, back in 1980, I believe was something in the range of $10 billion. Today it is $300 billion to $400 billion.

Chairman **NUNN**. Maybe I missed something because I thought your overall estimate that was plugged into this $244 billion was a number that wasn't a range. I thought your environmental part of that was a set number.

Mr. **BERUBE**. That's right. We're comparing two different things now.

The December report is a needs study. The modernization report represents a plan. This is the proposed funding level.

Under that modernization study, there would be a total of $32 billion spent from here to 2010 on environmental cleanup and D&D.

Chairman **NUNN**. Which Savannah River number did you use in there to get to that total?

Mr. **BERUBE**. I think I am going to have to refer to one of Mr. Wade's people here.

Chairman **NUNN**. In other words, where in the range did you come down? Somebody had to have a number for Savannah River in order to get the total, and every other place, too.

Mr. **BERUBE**. The overall level in the modernization report for environmental cleanup was not based on specific needs site-by-site, but, rather, in terms of a whole program.

Chairman **NUNN**. But some number had to be plugged in, or otherwise you might as well just be grabbing it out of the air.

Mr. **BERUBE**. I think it was better than just grabbing it out of the air.

Chairman **NUNN**. Did you say it was better to describe it as better than out of the air? [Laughter.]

Mr. **BERUBE**. Oh, no. I said not so.

The people that developed the modernization report tried to find a balance between what's needed—they used the information out of the December report that we provided. In terms of the total, they knew that in the defense production complex the needs are $35 billion to $63 billion. So, again, looking for a balance, reflecting budgetary constraints, they came upon this level.

Chairman **Nunn**. That's in the 2010 Report?

Mr. **Berube**. That's right.

The way that came about was ramping up from where we are today to $1 billion by 1995 to $2 billion by the year 2000, carrying that out to 2010. That was felt to be a fiscally realistic program and one that would accomplish cleanup in a reasonable timeframe.

Chairman **Nunn**. How can you say you can accomplish cleanup in a reasonable timeframe when you don't even have a site-specific number, and that number varies, just in the case of one site, by a factor of—what is 320 into 4 billion—by a factor of 1,000 percent, or 1,200 percent?

Mr. **Berube**. My judgment on that is that the number will fall close to the mid-range for most sites, but there will be sites where we are at the high end; and, by the time we are finished with the cleanup program, it is likely to be much higher than the estimates we can make now.

It's the nature of the beast. I'm sorry it's that way. Again, EPA is contending with the same problem.

As I was starting to say before, the original cost for the Superfund in 1980 was $10 billion. Today it is $300 billion to $400 billion.

Chairman **Nunn**. I can understand the uncertainty. I know there is uncertainty in this area. What I don't understand is the degree of certainty that is implied by the 2010 Report and the plan.

I am not contesting, I am not saying that you ought to be certain on these things. I know there is uncertainty. But the implication in the 2010 Report is that there is some degree of confidence in those numbers.

Mr. **Berube**. The confidence we have is that we need at least that.

Mr. **Wade**. Senator, let me try here.

To do what was required in the modernization study, what we did was take the 1989 level for environmental restoration and project it out in fiscal year 1990 dollars over 21 years. That is how we got to the number that is in there.

It was not by going site to site and saying these are the projects that we will do at those sites in 21 years. We were simply trying to provide a yardstick that said taking what we know now in 1989 and just simply carrying that out in fiscal year 1990 dollars, this is the money we will likely need to provide to do in a priority fashion what Mr. Berube's folks will tell us to do.

Chairman **Nunn**. It sounds to me like it is more a fiscal availability kind of number than it is an environmental needs number.

Mr. **Wade**. The modernization study number, Senator Nunn, is much closer to that, than being one of a project——

Chairman **Nunn**. Much closer to which?

Mr. **Wade**. An accounting number, a dollars available number.

Chairman **Nunn**. It's severely fiscally driven, then?

Mr. **Wade**. That's correct.

Chairman **Nunn**. Well, now, somebody has to do that. There's no doubt about that. But I thought we were asking the Energy Department and the experts to tell us what really needed to be done, and then let the President and OMB have their input, and, finally, in the final analysis, Congress decides how we do it.

Mr. BERUBE. Sir, we did do that with the report we submitted in December. That is unconstrained by budget. It identifies the needs.

Chairman NUNN. How did you get the need, for instance, at Savannah River, then?

Mr. BERUBE. There are two different values, and that accounts for the range, the cost estimates.

The low number is what we call an expected value. Again, each of our sites developed cost estimates using their best judgment of what would be required of them in terms of cleanup standards imposed by State and EPA regulators. The high end is a very strict interpretation of those same requirements.

For example, at the expected value, a solution to an inactive waste site could be stabilization in place with a cap over it. At the high end, you may have to remove all of the waste in that inactive waste site, treat it, and then redispose of it.

Chairman NUNN. Mr. Chairman, may I ask one other question?

Senator EXON. Yes, go ahead.

ANNUAL FUNDING FOR CLEANUP

Chairman NUNN. The 2010 Report, Mr. Wade, provides cumulative funding levels for DOE modernization and cleanup over 20 years, correct?

Mr. WADE. That's correct.

Chairman NUNN. Does it also include an annual funding level for each program?

Mr. WADE. No, sir. It does not.

It includes only annual funding through fiscal year 1991, Senator Nunn.

Chairman NUNN. Did you not prepare an annual funding, or has it just not been able to be released by your Department?

Do you have such a program, an annual funding profile?

Mr. WADE. Annual funding profiles were developed as part of developing the document. There was an executive branch decision that the annual funding requirements should be handled as part of each year's budget deliberations within the executive and between the executive and Congress.

Chairman NUNN. I think that is wonderful. But if only the executive has seen that, we have a hard time having a joint responsibility.

Can you furnish to us the annual funding profile that you have prepared?

Mr. WADE. I will take back that request, sir.

Chairman NUNN. As far as you personally are concerned, you would be glad to do it if you are permitted to do it, is that so?

Mr. WADE. If I am permitted to do it, I would be delighted to do it.

Chairman NUNN. Who will you have to ask about that?

Mr. WADE. I will talk with Secretary Designate Watkins. It will have to be a decision that involves both my agency and OMB, Senator Nunn.

Chairman NUNN. Thank you.

Senator Exon. Let me make a comment as a member of the Budget Committee that might be able to answer your question a little bit better, Senator Nunn, than it has been answered.

The obvious reason for it is, for not extending this out, is that there is no way that anybody can make up enough magical figures and mirrors, if we were honest in our budgeting process, to go along with the Gramm-Rudman-Hollings totals, which seem to be driving everything today.

That is the reason, I suspect, don't you, Mr. Wade, that the administration didn't want to go beyond 1991?

Mr. Wade. I think that is correct. Yes, sir.

Senator Exon. Thank you.

I believe you would be next, Senator Wirth. I suspect you might want to ask some questions about a place called Rocky Flats.

WASTE STORAGE AT ROCKY FLATS

Senator Wirth. You've got that right, Mr. Chairman.

Thank you very much and thank you for holding this hearing.

The cost of all of this, as we have been talking about, certainly comes as no surprise. Sitting around this very table, the four people who are here, we heard Mr. Wade about a year ago give us an estimate of about $100 billion for the replacement of the complex and more than $100 billion for the cleanup.

So it is no surprise that we are looking at numbers of this size and scope.

Troy, I want to thank you. I think you have really been exemplary in your commitment, your stick-to-itiveness and your attempts to really be honest about the figures we are looking at.

Mr. Starostecki of DOE has also been terrific in really stressing the safety issues. I hope that both of you are kept around in the new administration, as it is a refreshing kind of honesty and commitment that you have and for which we thank you very much.

First of all, I know that today's hearing is on the 2010 modernization study, but I have to ask you about WIPP and the Rocky Flats transuranic waste storage problem.

You are very familiar with that.

Rocky Flats is going to get shut down, as you know, in April or May, unless an alternative program is developed for the storage of those wastes. I was hoping you might be able to tell us what plans DOE has for interim waste storage and what specific alternatives are currently being examined.

Mr. Wade. Well, our number one alternative, Senator, is our hope to be able to resume shipments, or at least partial shipments, from Rocky Flats to Idaho.

Senator Wirth. Sir, has Governor Andrus suggested that he would be willing to discuss that?

Mr. Wade. Yes, he has.

When we met in December in Salt Lake City with the Governors of Idaho, Colorado and New Mexico, Governor Andrus laid down certain conditions and said if those conditions were met, he would be willing to reconsider his embargo.

He said yesterday in a press conference in Idaho that three of the four conditions that he had specified had been met; that if, indeed, he were advised that legislation had been submitted in the U.S. Congress for legislative land withdrawal, he would, indeed, reconsider his embargo.

So, from my program point of view, Senator Wirth, option number one is our ability to resume over the short term shipments into INEL, at least for the next 8 months to a year.

We are looking at other interim storage options. But I am not convinced we will be able to find any other interim storage options, other than Idaho, to get us past the April–May problem at Rocky Flats.

Senator **Wirth**. If Idaho does not work, you really don't have another option, is that right?

Mr. **Wade**. Not at the moment. No, sir.

Senator **Wirth**. Have you all thought about what some people have suggested, which is, moving the loaded boxcars into various military reservations around, where they would be carefully guarded. Or is it just as easy to shut down Rocky Flats for a while?

Mr. **Wade**. It is very painful to shut down Rocky Flats. The Governors all agreed that that was an action that we should prevent at almost any cost.

We are looking at precisely what you have just described, at moving the ATMX rail cars from Rocky Flats to existing military bases, where there are appropriate and adequate rail heads.

Now, we are limiting our search at the moment for such an interim storage option to States that are currently involved—like New Mexico, like Colorado, like Utah—that are all in the corridor like Idaho where this TRU waste will move.

Senator **Wirth**. Let the word go out for the record that we would like to see other States involved, too, if they would like to participate.

Mr. **Wade**. That is not a universally shared opinion, sir. [Laughter.]

Senator **Wirth**. Oh, I understand that.

I thank you and I wish you good luck on that. If we can help, let us know. I know that you are between a rock and a hard place in the worst possible fashion. The Governor is absolutely right in his position in Colorado. I hope you work it out with Governor Andrus.

But, if not, I hope we get wind of that early-on, so that we can all work on the option.

Mr. **Wade**. I appreciate your concern, Senator Wirth. I am advised that there may be a bill submitted in the House next week and, if so, perhaps that will then meet the fourth condition of Governor Andrus.

PRESIDENTIAL SUPPORT FOR 2010 REPORT

Senator **Wirth**. When I opened my comments, I was praising your and others' willingness to be forthcoming.

We are not going to solve this problem unless it has the political support and the financial support of the White House in this administration. First of all, can you tell me, has the President indicated his support for the 2010 Study?

Mr. **Wade**. I cannot answer that, Senator.

I have talked with Secretary-Designate Watkins about the 2010 Study, and briefed him on the issues and the implications of those issues. What discussions have taken place beyond that, I do not know.

Senator **Wirth**. Does the President know about the 2010 Study?

Mr. **Wade**. I can't answer that.

Senator **Wirth**. Have you gotten indications of support from Mr. Darman?

Mr. **Wade**. I don't think that that has been an issue at this point with the transition, Senator Wirth. President Reagan signed the report out on January 12, and I think it has not been the focus at this point in time of either OMB or the Department.

Senator **Wirth**. It is my understanding that the President is coming to the Hill on February 9, and, at that time, is also going to give us some revised budget estimates.

If that is the case, it seems to me that we'd better hustle at high speed and get this information up to Mr. Darman and to the President, so that they can see the size and scope of the honeymoon present left for them by the Reagan administration.

Mr. **Wade**. I understand your concern. I will share that with Admiral Watkins and let him take it from there.

Senator **Wirth**. Let me turn, if I might, to my next question, and I hope we have time for a second round, Mr. Chairman.

Senator **Exon**. We very likely will.

EMPLOYEE NOTIFICATION OF ROCKY FLATS CLOSING

Senator **Wirth**. I think all of us are concerned for the employees, many of whom have worked for almost a lifetime in a very skilled fashion, not only at Rocky Flats but at Fernald, Mound, Hanford, and a lot of other DOE plants. These people are now very, very worried, and justifiably so, about what is going to happen to them.

I think there is a lot of immediate reaction that hey, my job is going to be eliminated tomorrow, the plant is going to get closed.

First of all, have you all developed any kind of program for getting out information to employees?

For example, at Rocky Flats, the 2010 Study says that we don't start to move Rocky Flats until at least 1995. We will have to develop an alternative facility and that process is going to take a long time.

Then, after that, there is, I hope--and we'll want to get to this in later questions—a major set of cleanup problems at Rocky Flats, which have been touched upon here.

So, there is going to be plenty of work for a lot of people for a long period of time.

Has DOE gotten that information out to the employees at Rocky Flats, at Fernald, at Mound, at Hanford, as to what the employment pattern appears to look like? DOE has a very loyal and dedicated workforce and my experience has been that the more you work with them, the stronger the morale is, and the better the performance is, and the better everybody is overall.

Mr. **Wade**. I think the honest answer is we probably have not done that as well as we should have.

We continue to say at Rocky Flats, at Fernald, and at other places around the complex, we continue to remind people that this is a very preliminary planning document and that no decisions have been made; that any decision requires joint agreement between the administration and the U.S. Congress.

You are right that any scenario involving the relocation of Rocky Flats would still mean that there would be major activities there for a least a couple of decades.

Let me take back your concern and see if we can't do a better job not only at Rocky Flats, but at Fernald, and at Mound, as well as at other places.

Senator WIRTH. Would you have any problem with the committee directing the Secretary to do such a study? Do you think that is not necessary?

I have a sense that Admiral Watkins is very concerned about and understands the job issue. But I think the earlier he can get at the kind of morale, assurance, and explanation issue, the better off we are going to be.

Mr. WADE. I don't believe it would be necessary to direct Admiral Watkins. I think what we are going to have to do, Senator Wirth, is strike the right balance between letting the people at Rocky Flats know that this is a plan but even if the plan is developed, here is what it means to you as an employee.

Senator WIRTH. Can I leave it in your hands, then?

Mr. WADE. Yes, sir.

Senator WIRTH. You said you would bring it up with Admiral Watkins.

Mr. Chairman, maybe we could get back what they are all planning to do after their discussions.

I know that we haven't even had the hearings on Admiral Watkins in the Energy Committee, on his appointment. I know this is early, but it seems to me that the earlier we can together get this information out, the better off we will be.

Mr. WADE. We will discuss it within the Department and report back to the committee.

[The information follows:]

Senator Wirth's concerns were discussed within the Department of Energy and the following has transpired.

The managers of the Rocky Flats Plant and the Mound Plant have sent letters to all of their employees in an attempt to present the facts. A memorandum has been sent to the managers of the Albuquerque Operations Office, the Richland Operations Office, and the Oak Ridge Operations Office requesting that they take the same appropriate action. A copy of that memorandum is enclosed.

Enclosure.

MARCH 14, 1989.

Memorandum to: Bruce Twining, Manager, AL; Mike Lawrence, Manager, RL; and Joe LaGrone, Manager, Oak Ridge.

Subject: Modernization Report Recommendations.

There has been much publicity, as a result of the Modernization Study, about the possible cessation of production activities at Hanford and Fernald, and the possible relocation of activities at Rocky Flats and Mound. I am aware that this publicity has resulted in employee concerns at all locations.

Employees need to be made aware of the facts, albeit different at each location, concerning these proposed activities. First of all, they are only recommendations, and secondly, if implemented, several years are involved.

The Rocky Flats Plant Manager and the Mound Plant Manager have sent letters to all of their employees in an attempt to present the facts. I commend those communications and recommend that all sites consider doing something similar.

It is important that all employees be given accurate, timely information such that they are not unduly concerned.

Your cooperation in taking appropriate action is appreciated.

TROY E. WADE II,
Acting Assistant Secretary for Defense Programs.

Senator **WIRTH**. Mr. Chairman, may I ask you what the sense of timing is today?

Senator **EXON**. There are two questions that I would like to ask in the second round. Then I will be glad to go to Senator Glenn and then to you for a second round. I hope that we can wind this up in 15 or 20 minutes.

Senator **WIRTH**. Okay. I have four or five other questions and I hope we can get to those.

Thank you, Mr. Chairman.

Senator **GLENN**. May I just comment on his last question?

Senator **EXON**. Yes. Go ahead, Senator Glenn.

Senator **GLENN**. I conducted Mr. Darman's confirmation hearings in the Governmental Affairs Committee and also had a lengthy meeting with Admiral Watkins. I can assure you that they are both sensitive to the problems you are talking about in getting additional funding.

They were planning to get together to have additional meetings on this very subject. Whether or not that has occurred, I don't know. But I have talked to them both about it. We talked at the confirmation hearing and privately about it in some detail.

Senator **WIRTH**. Of course, the question is let's see it.

Senator **GLENN**. Yes, let's see it. I am hoping it is reflected in the February 9 speech of the President and I hope the budget is increased. We will see.

Thank you.

Senator **EXON**. Senator Wirth, may I ask a question of you?

There are lots of reasons that we would like to see Admiral Watkins on board as soon as possible. Is there some reason that the Energy Committee has not taken up Admiral Watkins' nomination?

Senator **WIRTH**. It doesn't have his papers yet.

Senator **EXON**. His papers are not here yet from the White House?

Senator **WIRTH**. That's right, as of yesterday. So we could not proceed with the hearing on his nomination until all of that paperwork is complete. The reason that was apparently late was because so much time and effort had gone into all of the questions with which you are familiar relating to Senator Tower. Presumably, we will move from there to the Watkins issue.

Senator Johnston had wanted to have a hearing this morning and could not do so because he hadn't gotten the paperwork.

Senator **EXON**. Thank you.

ENVIRONMENTAL CLEANUP

I'd like to go into two questions. The first one has to do with environmental compliance and funding, gentlemen. I guess Mr. Berube would probably be best on this.

I understand that most of the DOE defense facilities are now operating or will soon operate under a legally binding agreement, consent order, or permit that regulates new environmental compliance and cleanup.

This means that the States now have a significant leverage over the environmental compliance schedules.

How does this constrain DOE's efforts to establish a national priority-setting mechanism for compliance and cleanup?

Does DOE's budget request for environmental compliance and restoration reflect DOE's view of the national priorities, or does it reflect the need to meet the requirements of agreements with the individual States?

Mr. BERUBE. There are a lot of different parts to that question. Let me try to address them generally.

The enforceable agreements, consent decrees, permits, all of the commitments made or requirements in those are factored in when establishing priorities for funding. So, the answer to your question is it will make it difficult for us, but all of those commitments are factors in establishing priorities.

Senator EXON. Thank you.

What about cleanup priorities? What are or were the specific principles used in the 2010 Report, and within DOE generally, to set priorities for the cleanup? I'm talking about priorities now.

How can you distinguish, for example, between contamination problems that may pose an imminent danger to health and safety and those that may present a problem in the future?

Were those addressed and were proper priorities set up, in your view?

Mr. BERUBE. Sir, as I mentioned briefly in my oral remarks, we have started the effort of establishing priorities among all of these different environmental problems, comparing groundwater contamination problems with air pollution problems. The basic way that we compare those problems is by the potential hazard they represent to public health, and also environmental damage.

That is one very significant input into establishing priorities. But it is not the only input. There are other things, as we just mentioned—commitments and compliance agreements, regulatory requirements, considerations of cost and mission, technical feasibility, geographical equity. We cannot put all of our money at one site and not do anything at the other sites.

So there are probably a dozen different factors that have to be considered in establishing the priorities for allocating the money.

Senator EXON. And that has not been done yet.

Mr. BERUBE. We are in the process of doing that as we take the next step that I believe the Department has to take, and that is to translate all of this information into specific action plans, year-by-year, milestones.

This is where this effort to establish priorities will really surface.

Senator EXON. Thank you, Mr. Berube.

Senator Glenn.

PLUTONIUM PRODUCTION

Senator **Glenn**. Thank you very much.

An important point about a new production reactor—we are going to have a new production reactor, but that, of course, is not the end of the process. You have to extract material. You have to get the tritium out. You have to get the plutonium out. Tritium is one process and plutonium is another.

Plutonium involves a considerable amount of additional funds that I presume will be needed to rebuild or replace DOE's reprocessing capability, as well as the funds that would be required for waste management and cleanup from making more plutonium.

Where are those funds in your budget? I didn't find the figure for it?

Mr. **Wade**. Yes, sir. Let me help you with it here, Senator Glenn.

There is an item in the modernization budget, $200 million, for the upgrade of one of the canyons at Savannah River in order to allow plutonium recovery in existing facilities, but just upgrading one of the old facilities—$200 million.

Senator **Glenn**. All right. So that is provided for.

Mr. **Wade**. Yes, sir.

Senator **Glenn**. Let me add that I was impressed with your environmental chart. I think I counted 27 different laws that you have to comply with. You need several lawyers just to keep up with what the laws are, let alone do something about them.

Mr. **Wade**. And we have several. [Laughter.]

FEDERAL FACILITY AGREEMENTS

Senator **Glenn**. You have my sympathy, but not too much. I don't want you to think we should pull back on compliance. We just have to comply with these laws, that's all.

With regard to how you are going to enter into agreements—are you going to enter into compliance agreements with the different States?

Our Attorney General in Ohio, Tony Celebrezzi, whom I think you know, has entered into an agreement with you. He made, as I saw it, a landmark decision to go ahead and work out this agreement. I think what he worked out with you may well be the pattern that other States will follow.

As you go through this cleanup, will that, in fact, be a pattern you plan to follow? Will you agree exactly what is going to be done? Will there be some formal agreement that affirms the specific amounts of cleanup? Will there be any time reference?

What, for example, is your plan to guarantee cleanup at Fernald, after its production has ceased?

Mr. **Berube**. We do envision comprehensive, enforceable cleanup agreements at all of the major sites within the nuclear weapons complex. In fact, most of those sites will score high enough to be on EPA's National Priorities List, and, therefore, subject to section 120 of CERCLA-SARA, which requires these agreements for the cleanup.

Senator **Glenn**. Will that be a formalized agreement? Will that be up to you and subject to the whims of the budget each year, or will this be something that will be agreed to formally with each State?

Mr. **Berube**. We have no discretion with respect to the agreement. There has to be an agreement, and we have already executed some of those—one very recently for Lawrence Livermore National Lab.

Now, the schedule for cleanup will be controlled by funding levels. Of course, the regulators are very much interested in getting cleanup programs accelerated, and they put extreme pressure on the Department. But the budget will be the controlling factor here.

CLEANUP FUNDING

Senator **Glenn**. Do you have any ideas on how we are going to fund all of this? People are already talking about just taking it out of the Defense budget, and I don't think we can do that.

Have you had any discussions within the administration as to funding proposals for getting on with this program?

Mr. **Wade**. The only discussions that I have had, sir, were with representatives from the Department of Defense, who certainly recognized that the most obvious potential source of funding for the DOE was out of the DOD's portion of the 050 account.

I think it is an honest statement to say at this point in time that there has not been any selection of particular source to fund these and, in fact, we look to this committee for some help and some guidance. The numbers are big and we will require the support of this committee on a schedule, perhaps not the one that I projected, but some schedule that will allow us to get on with it and then go identify the source of the money.

PLUTONIUM SUPPLY

Senator **Glenn**. We all know the situation with tritium. There isn't any doubt where we stand with that.

Secretary Herrington was quoted once as saying that the country is awash in plutonium.

Does the Department still consider that to be the case? Do we have adequate supplies of plutonium as you see it now?

Mr. **Wade**. I think the Secretary made a correction for the record of that statement in saying that he had spoken incorrectly.

What we have said, Senator Glenn, is that there is no near-term shortage of plutonium and that it was for that reason that we made the decision that we did regarding the N reactor at Hanford.

We have gone on to say, however, that it is our judgment and the DOD's best judgment that, in order to provide the Nation the capacity and the flexibility that it needs, we should proceed with the Special Isotope Separation plant, which will be the only source of plutonium for the Nation in the decade of the 1990s.

Senator **Glenn**. Thank you.

Senator **Exon**. Thank you, Senator Glenn.

I am pleased to recognize Senator Wirth.

ROCKY FLATS CLEANUP

Senator **Wirth**. Let me go back to your favorite facility, if I might, Mr. Wade.

Last month, the Department ranked Rocky Flats' groundwater contamination as the highest potential threat to human health of any of its plants nationwide.

Is that accurate?

Mr. **Berube**. Yes, sir.

But I would add that those are preliminary rankings, as indicated in the report. They are preliminary. We are conducting sampling and analysis.

Senator **Wirth**. Do you mean we might get to a point of telling everybody who lives around Rocky Flats that actually it's only number two in terms of health danger and not number one? [Laughter.]

Anyway, we have a real problem, isn't that right? We have a real groundwater problem.

Mr. **Berube**. Yes. But it is a problem that is being addressed. In fact, the studies are quite well progressed on those.

Senator **Wirth**. Will the plan to move Rocky Flats be accompanied by a detailed plan tied to the same kind of schedule that you are attempting to develop in 2010 for cleaning up all the contamination at Rocky Flats and other sites?

Mr. **Wade**. Yes. That is the recommendation, the plan, as best one can make it when you have just a roadmap, now.

But the modernization study does call for the cleanup and the D&D of the existing Rocky Flats plant as part of the relocation project.

Senator **Wirth**. What we are concerned about, as you can understand, is that Uncle Sam will move out of Rocky Flats and leave this environmental timebomb sitting there, or that that might happen in Ohio or elsewhere.

Would you be willing to enter into a formal agreement, say, with the State of Colorado, in terms of a commitment to clean up that site?

Mr. **Berube**. Senator, there is already an agreement in place involving DOE and EPA in the State of Colorado. It's covering the beginning phases of the cleanup program.

Senator **Wirth**. That's generally related information, isn't that right?

Mr. **Berube**. But Rocky Flats will be on the National Priorities List and this comprehensive and legally enforceable agreement will be a mandatory requirement.

Mr. **Wade**. This is about relocation. That's what he's talking about.

Mr. **Berube**. I'm sorry. I misunderstood your question. I thought you were asking about the cleanup.

There will be an enforceable agreement for the cleanup at Rocky Flats.

Senator **Wirth**. And do you feel that all that is necessary is now in place?

Mr. **Berube**. No, sir.

Senator WIRTH. But you will be developing that kind of agreement with the State?

Mr. BERUBE. That's right.

Senator WIRTH. In your report, you point out that cleanup is going to "present a technological and financial challenge." Do we at this point know how to remove the contamination from a groundwater aquifer, such as the one that is polluted at Rocky Flats?

Mr. BERUBE. The type of contamination at Rocky Flats, the volatile organic compounds in the groundwater, yes, there is existing technology for that.

There are other contaminants that we have throughout the DOE complex for which there is no known cost-effective technology for dealing with that.

Senator WIRTH. At Rocky Flats, we know how to block the source of the groundwater contamination. But we don't know how to stop it, do we, once the plume gets going into the aquifer, which is the basic concern that you all have had about water pollution at Rocky Flats, isn't that correct?

Mr. BERUBE. My understanding of what did rank as the number one problem, volatile organic compounds in Hillside 881 at Rocky Flats, my understanding of that problem is that we do have the technology to deal with it.

Senator WIRTH. We have the technology to block it from going any further. The problem is that it is not moving——

Mr. BERUBE. To remove the contamination.

Senator WIRTH. Oh, you do have that?

Mr. BERUBE. To remove the contamination from the groundwater. Yes. That is my understanding.

Senator WIRTH. That's the first that I have heard that, in fact, that technology exists.

Mr. WADE. Now let's be careful here. I think we are perhaps mixing apples and oranges.

The French drain system on Hillside 881 will remove the volatile organics from the groundwater to which we have access, but that's—what's already gone through.

Senator WIRTH. That's the organics to which you have access. But there are others that you don't have access to that are now moving into the underground aquifer.

Mr. WADE. Yes, and we do not have a solution for that.

Senator WIRTH. We don't know how to do that. Thank you, Mr. Wade. That is what I wanted to know.

Mr. BERUBE. I'm sorry, Senator, but I didn't understand your question.

Senator WIRTH. I think that is an accurate clarification.

Now, do you have plans underway to figure out how you are going to get after the plume that is moving in the groundwater now?

Mr. WADE. That is a problem that we have in more than one location.

Senator WIRTH. Is there any money in the budget of the Department of Energy to research the discovery of an approach that might yield results that would stop the plume going into the groundwater that exists at Rocky Flats and other sites?

Mr. **Wade**. Let me make sure of my answer and supply one for the record on that. I don't believe there is a specific line item. I will have to go back, Senator Wirth, and find out what research is being done.

I'll get back to you on that.

Senator **Wirth**. Obviously, the urgency of this comes from the interpretation as to how fast that plume is moving down toward Standley Lake and how fast it is moving toward the Great Western Reservoir—these are the two major water areas used there—within the underground aquifer.

There are some who think that it is moving more rapidly, and others who say that it is moving slowly enough that we have time.

So it seems to me that, in looking at what research you are doing, we also have to know how rapidly that might be moving, so you know how urgent it is. I think it would be appropriate to get your evaluation of that if, going back to what we agreed earlier, this is the number one human health problem in the whole complex.

Do you see where I am going? If this is the number one problem, what are we doing about it? How serious is it? How soon is it going to occur? And how much money is being spent to research it?

Mr. **Wade**. I will get back to you with a full discussion of that.

[The information follows:]

The high priority placed on the 881 Hillside area triggered an investigation to determine the extent and magnitude of soil and water contamination. In addition, an engineering feasibility study was done to develop remedial action alternatives. The extent of volatile organic contamination has been bounded by the investigation and is relatively small. The remedial action involves construction of a drain to intercept all contaminated ground water. Water collected from the drain and a source pumping well at the most contaminated ground water site will be treated in a new treatment plant.

The cost for cleanup of volatile organic contamination at this high priority site is estimated to be $2 million for construction in 1989 and $250,000 per year for operation and maintenance through the anticipated 30 year cleanup period. These remediation activities are in the Department's budget.

Initial investigations have been completed to evaluate volatile organic contamination in groundwater at other Rocky Flats sites. However, additional investigations and feasibility studies are required and planned to determine the extent of VOC contamination. Preliminary estimates are $250 million to $300 million to complete the investigations, feasibility studies, and necessary remedial actions.

ALTERNATIVE USES FOR ROCKY FLATS

Senator **Wirth**. I know these are very difficult issues, but we have to get them up front and talk about them in as clear a way as possible.

While we are still on Rocky, do you have an examination going on now of alternative uses for the Rocky Flats plant, or is it assumed that Rocky Flats is going to be mothballed after it is cleaned up?

Mr. **Wade**. We do not have a study ongoing at this time. We have some correspondence from Senator Glenn asking us to begin to consider, his primary interest, of course, being Fernald, alternate uses of those sites.

Senator **Glenn**. It was the whole complex that we asked to be studied. It wasn't just Fernald.

Mr. **Wade**. That's right.

We have not begun that yet. The options available at Rocky Flats are many, Senator, including moving the whole operation or just moving the plutonium operations. And, depending upon which option is ultimately chosen, if, for example, it were concluded that you move just the plutonium facilities, you might end up with nonhazardous machining facilities still there.

So I don't think we are far enough down the line to have that answer yet.

Senator Glenn has asked us to put into place a process to look at alternatives, and we will do that.

Senator WIRTH. So you're saying that one of the options at Rocky is not closing down Rocky, but just moving the plutonium processing from Rocky. Is that right?

Mr. WADE. I think that is an option that will need to be considered. If the Congress agrees with us that relocation of Rocky is something that should be pursued—and you have not done that yet; we need to get to that as an agreement—then I think the next step, when one begins to develop the implementation plan that would result in the relocation of the Rocky Flats plant, to me, anyway, a reasonable thing to look at is do you move it all or do you move the plutonium parts of it.

I have my own personal feelings about that. But I think that is an option we would have to consider.

Senator WIRTH. I think we certainly would want to look at that. Senator Glenn has been very concerned about that, and I appreciate your coming back to him with that study. I think we want to make sure that we focus at Rocky Flats to try to understand as best we can what the options are. Might part of it stay open if the whole thing is moved? What happens to the site? Does it get mothballed? Does it become what some are calling a national sacrifice zone which is going to be sitting out there for some time to come?

I think those are all items that we have to know about.

Mr. WADE. I agree.

I think we are just years away from knowing precisely which option we are going to pursue.

Senator WIRTH. Yes, I understand that.

Thank you, Mr. Wade.

Thank you, Mr. Chairman.

NATIONAL SACRIFICE ZONES

Senator GLENN [presiding]. Rocky Flats has about 5,500 people. Fernald has something around 1,300. So we have a sizable number of people that we are concerned about. That is the reason we asked for that kind of study, across the whole complex, to see if there wouldn't be some civilian use for some of these facilities or if plants could be adapted to other Government projects.

I don't know what the answer is. But we would appreciate, as Senator Wirth said, getting that study going as soon as we could, because many people are going to be affected.

He also mentioned the so-called national sacrifice zones. Do you see any areas now that you are going to have to classify in that way and just put a fence around and a guard on the gate and leave undisturbed?

Mr. **Wade**. Let me begin and let Mr. Berube amplify.

I think we are going to find some areas that are contaminated with radioactive materials where perhaps the combination of lack of technology and cost effectiveness would tell us that it is safer to the environment and the public to leave it there, perhaps to stabilize it there, than it would be to try to move it.

I don't know that yet, Senator. I just have a feeling that we are going to find that condition.

Senator **Glenn**. I have, too. Some of these facilities are very large. They have reactors. They have a lot of radioactive material and high level waste. I can see that you may endanger more hundreds of thousands of people by trying to dig this stuff up and move it someplace else and you are not even quite sure where to move it to.

It may create more of a problem, be very expensive, and maybe endanger more people than it would to leave it in place.

I recoil from the idea of any national sacrifice zone. Just the term bothers me. But are you doing a study of that right now so that we'll know what we are dealing with when we start the cleanup?

Mr. **Berube**. No, we are not running a study like that.

From my perspective, although I understand what you said, Senator, and what Mr. Wade said, I would like to have as a goal for cleanup at least unrestricted use at the surface. In other words, we have removed all of the contamination from the surface.

Whether we are able to do that with respect to groundwater, I am not certain.

Senator **Glenn**. Well, that's hard because some of these areas are contaminating aquifer levels. We have a problem with that at Fernald. Senator Wirth has the same thing at Rocky Flats. Other places such as Hanford have the same problem.

So, just to leave things in place is not necessarily the answer unless you can make sure that the contamination occurring from what is in place is stopped.

Mr. **Berube**. I agree. That is what I was trying to say.

Senator **Glenn**. That's hard.

Mr. **Berube**. We need to take care of the surface contamination facilities and everything else.

ENVIRONMENTAL RESEARCH

Senator **Glenn**. Do we have the technical knowledge to do all of the cleanup that has to be done now, or do we have to do research even on how we are going to do some of the cleanup?

You mentioned the aquifer level. How about the 149 single shell tanks at Hanford. That's high level waste, tough material to deal with. It almost has to be dealt with by remote-controlled vehicles.

Mr. **Berube**. There is significant additional research and technology development that is required.

Senator **Glenn**. Do we have research funds in the budget?

Mr. **Wade**. In some places yes.

Let me use an example with which I am familiar, Senator, since I spent 4 years out there.

There is a significant problem with the buried plutonium waste in Idaho. Several years ago, an experiment was conducted to see if you could dig up that plutonium waste, which was, as you described earlier, buried in the days the "Russians were coming," that is, just literally dumped.

This was a very delicate, complicated research program that involved people in air supplied suits and all of that. It was so risky that the National Academy of Sciences' finding was that it was safer to leave the material where it was than to try to move it.

Now, since that time, in the past 2 to 3 years, we have found in Idaho evidence that organics are moving from that waste dump into the aquifer, in Idaho. And so, we now are back with an accelerated waste characterization program, to find out where it is, where it is coming from. We are going to have to come up with the R&D to deal with it because we know it is now moving.

And so, the finding of the National Academy of a decade ago, that it is safer to leave than to move, is no longer valid.

Senator **Glenn**. Do we have the technology to move those silos behind Fernald? To bring this back to my home State of Ohio, do we know how to do that and take care of the radon emissions?

Mr. **Wade**. No, sir.

The silos at Fernald, the radon problem and the high activity problems are another thing that we do not know how to handle technically. We are working on that with Westinghouse of Ohio. But that is a good example of another one where we don't have the answer.

NEW PRODUCTION REACTOR SCHEDULE

Senator **Glenn**. Let me go back to the prioritization, again, of whether we build new reactors on a sequential basis.

We have the three reactors at Savannah River, P, K, and L, and we are trying to get those back onstream. I don't have any doubt that we will approve at least one new reactor. Whether we go beyond that or not, I am not quite sure at this point.

But it would seem to me that, if we have those on line and producing then that might be enough. If it is, then fine. We'll get by with just one new reactor.

Now, if we have to go to a second one, if the P, K, and L reactors don't work out very well, and we have to build a second one, then we'll go to a second new reactor. So it would seem to me it could be sequential, and we could make those decisions as we go along and not require them all in this year's budget, which is going to be very tight.

Obviously, if we are going to build one new production reactor and delay another one, the question is do we go with an NPR at Savannah River by your estimate, or do we go with laser isotope, SIS, in Idaho? Do we also develop SIS as a new technology that would have civilian spinoffs?

Mr. **Wade**. Let me answer one of them and then I'll ask Mr. Cochran to address the other.

Senator **Glenn**. Do you agree first that sequential production is something we may have to do just from a budgetary standpoint?

Mr. **Wade**. Yes. I think with regard to the reactors, that is the plan.

In fact, Ron, perhaps you could elaborate on that.

Mr. **Cochran**. Okay.

The plan that we put forward, as you know Senator, was one that called for proceeding on an urgent schedule with construction of a heavy water reactor at Savannah River.

We also said that we were going to proceed with preparations for construction of an HTGR, a modular high temperature gas-cooled reactor, at the Idaho site.

Senator **Glenn**. But if you knew you were only going to get one for a while, would you want the Idaho facility first?

Mr. **Cochran**. Deputy Secretary Salgado was asked that question and his answer was the Reagan administration's position, since the incoming administration has not addressed the issue.

The answer to that was that the Department would go to the President before agreeing to back off on the current strategy of two reactors, and only if the President agreed that that was necessary and in the best interests of the country would we back off the current strategy.

If we backed off the current strategy of two, we would back off the MHTGR program schedule first. That was the way he couched the answer, sir.

Senator **Glenn**. Is there any doubt about the technology that would be used in Idaho? Is there enough doubt about it that you would want to go with Savannah River as a more reliable source right off the bat? Or is the technology good enough that we could go with that alternate technology if we wanted to?

Mr. **Cochran**. We are relying very heavily on the report, the work that was done by the Energy Research Advisory Board.

What they concluded was that the heavy water technology was the most mature technology, and that is why they recommended going on the urgent schedule.

They also felt that the modular high temperature gas-cooled reactor was the next best technology to proceed with, based on some very good results with some tritium target work and also on the potential for an increased level of safety assurance, compared with other reactors.

Senator **Glenn**. Don't we gain the possibility of some good civilian spinoff of the HTGR if we go that route instead of using the older technology?

Mr. **Cochran**. That's what the second point of that comment was, sir.

Senator **Glenn**. So we would go with it.

Mr. **Cochran**. If we provided an increased level of safety, that would be beneficial for the commercial nuclear industry, which they felt was very important.

Having said that, I must point out that both the reactors we are talking about will really be first of a kind reactors. In other words, even the reactor at Savannah River will not look very much like the current reactors down there. It will use the same fuel and the same targets. However, we will take advantage of the reactor developments that have taken place over the past 35 years, and the reactor designs that you will see will look much more like modern light water reactors than the present heavy water reactors at Savannah River.

That means that there is some development work required there. In the case of the high temperature gas-cooled reactor, there is a design that has been developed for the commercial sector. Our reactor would look very much like that design. But there is some development work that has to be successfully done to check out the target and the production mode and to check out things like the principal equipment, the circulator for the helium. We have not yet operated one of this type successfully in this country.

Senator GLENN. Thank you.

SOVIET NUCLEAR WEAPONS PRODUCTION COMPLEX

Senator Wirth.

Senator WIRTH. Just on that front, there are those of us who believe, then that we only have to build one, and that one has to produce tritium. It is insane for us to be creating more plutonium out there. We are going to have more arms control. We are going to be returning a lot of warheads to the stockpile. They believe tritium is the biggest need.

I just do not understand this continuing debate of how we are going to build both reactors particularly at a time when the budget is so constrained and we have these other very, very significant demands.

Then you have a political piece of it, too. People think if you build a couple of reactors, that we are solving the problem. But we aren't even beginning to scratch the problem.

That is just from one member of both the Armed Services and Energy Committees who has sat and watched this for a long period of time.

Let me make us all feel a little bit better.

Tell me, Mr. Wade, what do you know about the Soviet plant for manufacturing nuclear weapons?

Mr. WADE. We do not know a lot about the Soviet nuclear weapons production complex.

Senator WIRTH. If what I know about Soviet environmental problems overall, which are rising to the top of the surface there as a major ecological disaster, particularly in central Asia, is accurate, I would image the Soviets have similar problems with their nuclear weapons complex.

Mr. WADE. I would be delighted to have a conversation with you about that in a different forum, if I may.

Senator WIRTH. I look forward to hearing about that.

Senator GLENN. Tim, let me turn over the chairmanship to you.

Senator WIRTH [presiding]. Thank you, John.

Maybe we can get into some of that in a future closed session. My guess is that they are finding themselves with a situation that is probably geometrically worse than ours and that that, in turn, is going to indicate to them, as increasingly it indicates to us, that nuclear weapons are not a cheap military project, that the costs are overwhelming, and that the faster we get on to the business of more aggressive arms controls, the better off we are going to be.

I thought you might have a comment or two that would make us feel better after all of this, Troy.

Mr. **WADE**. Well, I regret to say that I probably don't, Senator Wirth.

The problem is—and I do not mean to philosophize here—if you look at the U.S. nuclear weapons complex in terms of capacity, as we said in the modernization study, it takes greater than two-thirds of the existing operating budget each year to provide the capacity to produce one weapon.

Senator **WIRTH**. Yes, I understand that.

Mr. **WADE**. When you don't have an arms control scenario on the table that ends up, at least in the foreseeable future with no nuclear weapons, you kind of are then forced to deal straight-away with this capacity question.

Senator **WIRTH**. I understand that. But to create new plutonium at a time when we are going to be bringing a lot of weapons back—and from everything that I read, this is what is going to happen in the next decade—that doesn't make sense.

Mr. **WADE**. Perhaps it was before you came in, Senator, but I had a discussion with Senator Kennedy, who, by the way, referenced the conversations that we had had earlier. We did, as a matter of policy, decide—and I said I would provide to Senator Kennedy specifics and the names of the people who decided in the steering group that guided the modernization study—that we would only look at arms control treaties that were either in force or close to being in force.

Senator **WIRTH**. I understand that. I am not knocking you that you haven't done that. I'm just saying that, as we look ahead into the future, it's going to be a long timeframe. We have heard about planning, planning, and planning over and over again. There are going to be a number of years in there.

I think there are a lot of opportunities in this. This has nothing to do with this issue, so we should leave it aside. This is a philosophical and long-term approach as to what I think we ought to be able to do.

MONITORING OF WORKER HEALTH

Let me ask you a little bit about health effects, an issue that you and I have talked about in the past.

For many, many years, I have been concerned and very frustrated at the response from DOE—and you are familiar with that—about the fox guarding the chicken house syndrome.

You know, on the one hand, DOE has the responsibility for producing weapons, and in the process of doing so, its workers are probably being exposed to a good deal of plutonium.

On the other hand, DOE is responsible for monitoring the health effects. For many years, I have attempted to get DOE—and this is before your watch, and then last year as well, Troy—to get DOE to understand that we ought to be separating this out; that it is appropriate for some other agency to be the health monitor.

I will be introducing legislation again this year, as I have for a number of years in the past, to separate the two.

Can you tell us from your perspective if there is any reason why HHS or some agency within the National Institutes of Health, which is more suited to the kind of health research that we are talking about, shouldn't be given the authority to monitor the health of its workers?

Mr. WADE. I am sure that that could be done if it were deemed appropriate to do so.

My own personal opinion, though, Senator, is that our worker protection, worker exposure, radiation exposure of workers at Rocky Flats record is pretty good. It is not perfect. But it is pretty good.

We run a very unique set of plants. Other than commercial reactors, there just are not really plants in the United States that are like ours. It requires different specialties, different variations of disciplines that we now know.

In some cases, it requires equipment that is indeed unique to our facilities. As long as we can convince people like yourselves and our oversight groups within the Department that we are doing an adequate job, it is not clear to me that we gain anything by going to another agency. But I could be wrong.

Senator WIRTH. Do you know of any other agency of the Federal Government that monitors its own health effect plants?

You might want to submit that for the record. I don't think there is one. There is nothing else that has this kind of what I would call a "fox and chicken house" syndrome going to it.

I think it is very unwise.

Mr. WADE. We will do that.

[The information follows:]

The Department of Energy (DOE) cannot speak for other Federal agencies regarding the manner and extent to which they monitor the health effects at their respective facilities. However, the Department of Labor (DOL) Regulation on Federal Employee Occupational Safety and Health Programs (29 C.F.R. 1960) assigns to the head of each Federal agency the primary responsibility of maintaining an effective program to ensure safe and healthful working conditions for Federal employees, consistent with the provisions of section 19 of the Occupational Safety and Health Act.

Nevertheless, DOE is unique in that its nuclear research and development facilities, while Government-owned are operated by contractors. It is the Department's position that, in enacting the Energy Reorganization Act of 1974 (42 U.S.C. 5801, et seq.), Congress reserved to the Energy Research and Development Administration (a predecessor agency to DOE) the authority to establish and enforce its own health and safety programs. This interpretation has been adopted by several high ranking officials in the DOL, including the Administrator of the Wage and Hour Division and at least three DOL Administrative Law Judges, relative to safety-related complaints filed by DOE subcontractor employees.

In order to implement its health and safety program, DOE has set up a system of complaint evaluation and review, with appropriate authority and responsibility assigned to the various DOE field managers, with overall oversight vested in the Office of the Assistant Secretary for Environment, Safety, and Health. It is inaccurate to characterize this as a "fox and chicken house" approach.

TMI FUND

Senator WIRTH. We will get back into that. Senator Glenn has been concerned about this and I have been concerned about it. This may be the time when we can finally make some progress in separating the two out.

When you say that these are unique plants, I mean, so what. That doesn't mean that we shouldn't have that kind of separation.

I understand the argument that this is unique. Nobody else, thank goodness, is building nuclear weapons. But still, I think that the health compliance ought to be separated away.

On being a pretty good record, let me ask you a couple of questions about that.

The workers at Rocky Flats are starting to be concerned about what some of the historic health effects may have been, and are starting to open conversations or attempting to open conversations with DOE and DOE health records about this.

Are you familiar with the emerging concern among workers there?

Mr. WADE. Yes, I am.

Senator WIRTH. Would you describe to us what that concern is?

Mr. WADE. I am familiar with the concern about private health records. I am familiar with the concerns of the unions and some of the groups around Rocky Flats and the Governor about proceeding with those reconstruction studies which would lead to epidemiological studies. If that's what you're talking about, I'm familiar with those concerns.

We have begun to try to work out how we would deal with those sorts of things.

Senator WIRTH. They have expressed to me a real concern about access to data and access to the studies done on the data.

I then became very concerned when I heard that DOE has refused to release the historic health data on approximately 300,000 past and present DOE workers to researchers who are doing a study of the so-called "Three Mile Island Fund."

These are a group of workers who were monitored more systematically than any other population. I heard that DOE has refused to release the data to that study.

Do you know about that?

Mr. WADE. I do not, sir.

I will have to look into that and get back to you for the record.

Senator WIRTH. Would you do that? I think that is very important.

I think it is important if people in my back yard are concerned about getting data. Then there is this major study going on, long-term data, and DOE is refusing to release the information—and I hope my information about the so-called "Three Mile Island Study" is incorrect.

Mr. WADE. I'm sorry. I am just not familiar with it.

[The information follows:]

Three Mile Island Fund (TMI Fund) requested certain computerized database files and data analysis files maintained in the files of Oak Ridge Associated Universities, Pacific Northwest Laboratory, and Los Alamos National Laboratory. The requests raised some very difficult legal and policy issues which include the applicability of the Privacy Act to workers' records and of the Freedom of Information Act (FOIA) to data from government-sponsored research in progress. These required a thorough review and consideration of the long-term implications of providing access to a variety of data and discussion with TMI Fund.

On February 22, 1989, the Department released to Mr. Daniel Berger, Attorney for TMI Fund, specific computerized data analysis files without personal identification.

However, some of the requested records, specifically the information obtained from death certificates, are not records of DOE because they were provided by various States pursuant to agreements that restricted access to and dissemination of that information. Since the States retained control of the documents, the records are not subject to the access provisions of the FOIA. Nevertheless, DOE has attempted to assist the TMI Fund in obtaining this information by providing it a list of the States with which agreements were entered and copies of those agreements.

COMPARISON OF COST ESTIMATES

Senator WIRTH. Let me just jump to two more issues.

One goes back to the budget issue. You estimate that modernization and cleanup in 2010 is going to cost $81 billion over the next 20 years. That is the estimate in 2010, isn't that right?

Mr. WADE. Yes, sir.

Senator WIRTH. But GAO, in July 1988, estimates the cost to be about $155 billion. Are you familiar with that study as well?

Mr. WADE. Yes, sir.

I think that, while it sounds——

Senator WIRTH. Obviously I am going to ask you about the discrepancy between the two.

Mr. WADE. It sounds like there is a big disparity. But I think, in my conversations with GAO, it is because we added numbers in a different way.

For example, in our modernization study, we include all of the waste operations funds in the $166 billion it is going to take to operate the facilities over the next 21 years.

In the GAO rackup, they included all of the waste operations in a different category.

Senator WIRTH. It's because you put some things in operations and not in modernization and cleanup. That made your number lower and GAO's number higher, is that right?

Mr. WADE. I believe it is different accounting methods.

Senator WIRTH. Has anybody at DOE done a sort of side-by-side, so that this discrepancy does not appear to exist? Maybe it has been done.

Mr. BERUBE. Yes, Senator. We have done it and shared it with GAO.

As Mr. Wade is describing, it is not that there are major differences in the cost estimate; it's just where you put it, whether it's in base program or whether it shows as discreet projects.

We would be pleased to provide for the record a chart that reconciles the different cost estimates.

Senator WIRTH. So you are comfortable with that. You have looked at it and GAO has looked at it and so on. I was just struck with the difference and that is why I am asking the question.

Mr. BERUBE. Part of it is scope, with respect to what is in the estimates, and part of it is also timeframe.

The GAO estimate, for example, goes out beyond 2010, and modernization only goes out to 2010.

Senator WIRTH. Well, if you have done that kind of analysis, would you send that up to me. I would like to take a look at that.

Mr. BERUBE. Yes, sir.

[The information follows:]

RECONCILIATION OF COST ESTIMATES
($ Billion)

Scope	GAO Report (GAO/RCED-88-19/BR)	DP ES&H Needs Report (FY88-Post 2010)	DOE ES&H Needs Report		Modernization Study/Plan (FY90-FY2010)
			(FY89-Post 2010)	Adjusted DP Only (FY89-FY2010)	
1. Environmental Remedial Action	35-65	34-61	35-64	28-31	32
2. Environmental Corrective Action	a	3-4	4-9	3-9	(25)[b]
3. Safety & Health Corrective Action	a	3-5	4-5	3-5	
4. ES&H Base Program	a	36-40	1/yr	16	
5. Other Environmental Cleanup	a	a	2	NA	NA
6. Decontamination & Decommissioning	>15	a	4-6	2-3	c
7. Radwaste Projects	30	a	5	4	25
8. Radwaste Base Program		a	0.8/yr	17	
9. Total ES&H Related Costs	80->110	66-110	53-92 1.8/yr	73-85	82
10. Modernization Initiatives	35-45	a	a	a	51
11. Defense Program Requirements	a	a	a	a	135
Total Defense Programs Cost	115->155				244

(a) Not in report
(b) Included in 11
(c) Included in 1

BUILDING 371

Senator WIRTH. We talked in the past about Building 371. That was described by one wag as—you will remember the old coffeepot syndrome, the very expensive coffeepot on the C-5A. Well, this was described as DOE's own coffeepot that was percolating away in the backyard, at costs of hundreds of millions of dollars.

In any case, the question concerns Building 371, our own local coffeepot.

As you know, that building has not been allowed to operate because it had all of the major problems. You are familiar with how heavily over-budget it is. It is a building that has never worked, and so on.

Last year, you will remember that we had something of a discussion about whether funds ought to be committed to cleaning up, to fixing up Building 371. I was concerned that we were pouring more good money after bad.

We agreed that the Building 371 funding would await the 2010 Study, and your commitment there, and it is fine with me to go ahead. I just want to say to you, for the record, that I am satisfied that the funding for helping to fix up 371 be released and let's get on with it. I think that is an important thing to do.

Mr. WADE. Thank you.

Senator WIRTH. Related to that as well is a concern about how much money we are going to be putting into 371. It is my understanding that there is a natural break-point about half-way through the renovation of 371; that you can bring it up to a certain production level for one cost, and then to bring it up all the way as a very sharply increasing cost.

It has been suggested to me that maybe we should only do Phase I of Building 371, and then put our funding into relocation of that plutonium processing at Rocky Flats.

Is that a fair way of describing what might be done at Building 371?

Mr. **WADE**. Yes, and that is the plan, Senator.

We have designed a program, the total cost of which is $400 million, but which I believe has in it three off-ramps at different locations. The first off-ramp is $45 million.

Is that right, John, as you recall?

Mr. **MEINHARDT**. I am John Meinhardt of the Department of Energy. As I recall, it is $45 million, and somewhere or another it is around $125 million.

Mr. **WADE**. We think that is precisely the way we have laid the program out.

ROCKY FLATS INCINERATOR

Senator **WIRTH**. Are you familiar with the lawsuit that the Sierra Club filed yesterday in Federal District Court, about bringing the incinerator at Rocky Flats up to the RCRA Code?

Mr. **WADE**. I am only familiar to the extent I have read the newspaper accounts of it.

Senator **WIRTH**. The Sierra Club is alleging that DOE is not acting to bring the incinerator into compliance. That is one of the items in there.

You might want to look at that. Obviously, your lawyers are going to be looking at that.

Do you know anything about that, Mr. Berube?

Mr. **BERUBE**. All I know also is what was in the newspaper account. I am sure that we will have to talk to our attorneys.

Senator **WIRTH**. It is beyond me why we are spending taxpayers' money to defend Uncle Sam for not bringing an incinerator into compliance with RCRA, rather than just spending the money to bring it into compliance.

I don't understand that. Maybe you can give me an answer to that.

Mr. **WADE**. We'll get you an answer back.

[The information follows:]

The Sierra Club filed a citizen enforcement suit in Federal district court February 1, 1989, alleging the Department of Energy (DOE) and Rockwell International with illegally treating, storing, and disposing of hazardous waste at the Rocky Flats Plant. Specifically, the Sierra Club contends plutonium recovery incinerators at Rocky Flats violate provisions of the Resource Conservation and Recovery Act (RCRA).

The Department believes RCRA does not apply to this process. The incineration process is a material recovery unit integral to the recovery of special nuclear material (at Rocky Flats this is used to recover plutonium). A Federal Court of Appeals *(American Mining Congress* vs. *Environmental Protection Agency (EPA))* has ruled that recycle operations, and their feed materials, are not subject to RCRA as the materials processed are not considered waste or discarded material.

Nonetheless, the incineration process at Rocky Flats is regulated. The incineration process operates under a 1985 Colorado Department of Health Clean Air Act permit and is operated in full compliance with all state and Federal clean air regulations for criteria air pollutants. The level of plutonium emissions from the entire Rocky Flats Plant for all recovery, manufacturing, and treatment operations is well below existing standards for radionuclide emissions (by a factor of greater than 100).

Mr. WADE. Just in reading the newspaper article, it looked to me like it was a disagreement about in what category did the incinerator fall. It looked like we were arguing that it was part of the existing plutonium operations at Rocky Flats and the Sierra Club thought it fell into an entirely different category, in terms of RCRA compliance.

Senator WIRTH. I think that DOE is, at this point, contesting the State of Colorado's right to permit a so-called Special Nuclear Materials Recovery Incinerator, under RCRA. Can the State permit that under RCRA? I think that is the issue.

In any case, I thank you all very much for your attention to this. I look forward to hearing from you. I wish you good luck, Mr. Wade.

Mr. WADE. Thank you, Senator.

Senator WIRTH. Probably Danny Wall has the worst job in Washington and you have the second worst job, I think.

Mr. WADE. I don't know him, but I would like to meet him. [Laughter.]

Senator WIRTH. Yes, we ought to get the two of you together so that you can commiserate.

Thank you all very much.

[Questions for the hearing record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR J. JAMES EXON

ISOTOPE SEPARATION FACILITY

Senator EXON. DOE plans to begin operating an isotope separation facility within the next 5 years for purposes of creating a plutonium "contingency." Why should the nation devote a billion dollars of scarce resources to create a plutonium contingency when we will not have a *tritium* contingency before the end of the century—and quite likely well beyond that time?

Mr. WADE. The Department of Energy has the responsibility of guaranteeing that the defense needs for tritium and special nuclear materials, including plutonium, are met in the short term and can be met in the foreseeable future. Our initiative to provide a reliable source of tritium through the New Production Reactor (NPR) program is being accomplished on a schedule fully compatible with both the anticipated need and the available funding.

The reduced availability and power level of the Savannah River Plant (SRP) reactors mandates that they as a first priority, be devoted to the production of tritium until the NPR is operational. Their availability subsequent to NPR is uncertain in light of their advanced age at that time. The Special Isotope Separation (SIS) plant, therefore, could possible be the Nation's only source of new weapon-grade plutonium during the period 1996 through 2005. The SIS production facility is considered to be time critical and essential because unless the project is fully supported now, the plant will not be available during the period of greatest vulnerability to plutonium supply.

The decision cost to complete the SIS production facility is estimated to be $812 million for fiscal year 1990 through fiscal year 1995 with operation beginning in September 1995. Delays in the program will be costly both regarding the availability of the needed production capability and regarding its ultinmate cost, which is estimated to rise by about $50 million per year of construction delay beyond fiscal year 1990.

For all of these reasons, DOE believes that the construction of the SIS production plant should be accomplished on the schedule indicated in the fiscal year 1990 submittal.

MODERNIZATION REPORT

Senator **Exon**. The modernization report identified some $50 billion as the minimum amount needed for modernization over the next 20 years. Aside from a few prominent capital projects—such as the NPRs and SIS—the balance of the funding is computed by a general formula of "4 percent reinvestment." After decades of underfunding—the report points out that historical levels of reinvestment were on the order of 2 percent or less—why do you believe that 4 percent is adequate now, especially when industry's average is more like 7 percent? How can this 4 percent rule be rationally implemented across the complex, especially in years when spending is at peak levels for the big new construction projects like the new production reactor and SIS?

Mr. **Wade**. The annual reinvestment rate of 4 percent of facilities' replacement value is in addition to the larger projects such as new production reactor capacity, special isotopes separation plant, upgrades to plutonium recovery facilities, modernization of uranium facilities, and upgrades to virgin plutonium facilities. This rate of reinvestment, in addition to the large construction projects, will permit continual replacement of facilities and equipment and essentially yield a new complex with a 25-year time period. In this manner, modernization of capital assets could be accomplished in a businesslike approach and problems associated with technical obsolescene and changing standards and requirements could be addressed before reaching the crisis stage. While some adjustments in scheduling could be made when large outlays are required for the larger projects, for the most part, the reinvestment funding is needed on an annual basis considering the state-of-the-art, high technology, and unique needs of the nuclear weapons complex.

MODERNIZATION NEEDS

Senator **Exon**. Based on the estimates of modernization needs in the 2010 Report, would revitalization of the nuclear weapons complex be facilitated by DOE's submission of a long-term capital budget, say 10–20 years, that would allow Congress to assess and approve a specific modernization plan, rather then just a general "4 percent replacement rate of capital" not tied to particular projects?

Mr. **Wade**. The Department annually prepares a 5-year plan which defines the operating and capital strategies and serves as a basic guidance document for resource planning. This plan, based on fiscal projections provided by the Office of Management and Budget, documents requirements within budget expectations.

A longer term projection based on a specific modernization plan may not provide the flexibility to adjust to uncertain funding or changing program emphasis. Rather, full authorization and 2-year appropriations for specific modernization projects would permit more efficient acquisition of capital assets.

2010 STUDY

Senator **Exon**. The 2010 study recommends that a number of facilities be relocated, consolidated or terminated. I would like to ask you some specific questions in this area.

1. The 2010 study recommends that the Fernald facility be closed within the next few years because its production mission is no longer needed. Does the fiscal year 1990 budget request propose to fund production activities at Fernald? If so, why are the modernization study's recommendations not being implemented?

2. The 2010 study recommends relocating the nuclear materials activities at the Mound plant but does not propose to start this relocation until 1995. Can this schedule be accelerated?

Mr. **Wade**. 1. The fiscal year 1990 budget provides funds to preproduce uranium metal at the Feed Materials Production Center (FMPC) to meet nuclear weapons and reactor needs for depleted uranium through fiscal year 1995. This will allow the time to evaluate/qualify candidate suppliers for post-1995 needs.

2. The schedule for the relocation of Mound nuclear materials activities could be accelerated to commence prior to 1995. The 1995 schedule start was determined on a balance with all other modernization activities and their funding levels scheduled for the early 1990s; this approach is reflected in the Mound functions relocation categorization as a Priority 3 (Optimal for the Future) activity in the "2010 Report." The nuclear materials activities recommended to be relocated constitute approximately 28 percent of the direct and direct support workload at Mound. The remaining mission assignment, which is primarily explosive operations, would continue at the current location.

RELOCATION OF ROCKY FLATS

Senator **Exon**. The 2010 study also recommends that the Rocky Flats operations be relocated but does not expect to complete this move for more than 20 years. What is involved in accelerating this activity? I would also like to ask you to study the feasibility of accelerating this relocation by moving part of the weapons return mission scheduled to be conducted at Building 371 at Rocky Flats to Idaho, as part of the chemical processing facility that is to accompany the special isotope separation project.

Mr. **Wade**. The Rocky Flats Plant (RFP) relocation schedule reflects a consideration of a number of activities necessary to effect an orderly transfer of functions to a new location. These major activities include the preparation of an Environmental Impact Statement (EIS), site selection, technology development, design, construction, testing, and a period of operation for qualification and certification of the new facility to assure the reliability of meeting schedules and product quality. The preparation of an EIS and site selection may require up to 3 years. Some activities such as technology development and preliminary designs can be carried on in parallel to some extent. Construction may require up to 8 years followed by up to 2 years of testing. The transition period (qualifications and certifications) will require up to 4 years. With consideration of some contingency in the estimates, the schedule could extend to a total of between 15 and 20 years. Most of the major activities are sequential in nature.

However, as technology and designs are developed, there may be opportunities to accelerate the time required for the RFP relocation.

In regard to association of the 371 Building and the Special Isotope Separation (SIS) project, a recently completed planning study indicates that the plutonium (Pu) processing building (PPB) being constructed as part of the SIS facility at INEL has the potential to assume the plutonium processing activities now performed at Rocky Flats. Some of these activities could be assumed, if desirable, concurrent with the initial isotope separation mission during the period 1996 through 2005. Subsequent to this mission, the study indicated the PPB could be equipped to perform the full Pu recovery processing mission. It would be necessary to perform additional environment documentation and to purchase the required processing equipment in advance of installation. These potential advantages would occur only in the event that INEL is selected as the site for the relocated RFP activities. The close proximity of Pu recovery and new weapon fabrication facilities should be maintained for overall production efficiency. While use of the SIS PPB in this way would facilitate a move from Rocky Flats, it does not obviate the need for the requested upgrade of the 371 Building at Rocky Flats. That capability is needed now for weapons-related processing to replace buildings that are operating beyond their expected life. This situation will continue through a period of operation concurrent with a new facility to assure continued proven capability and finally to assist in the clean up of the Rocky Flats site prior to its abandonment.

CONTINUING NUCLEAR TESTING

Senator **Exon**. What assumptions does the 2010 study make about the need to continue nuclear testing? Does it assume that more money is needed than today to support a readiness program for a low-yield test ban?

Mr. **Wade**. Nuclear testing must continue pending future progress in arms control and should be increased to prepare for a future where the character of the nuclear deterrent may undergo fundamental changes in response to a wide spectrum of uncertain military, technical, and political futures.

A viable test program to prepare for additional test limitations will require additional funding over what is available today. The modernization study recommends spending $8.2 billion above current spending levels for RD&T and operating expenses and an additional $3.4 billion for capital investments. The purpose of this research is twofold. The first is to assess the impact of potential increased testing restrictions on our ability to maintain the reliability of the current stockpile and to respond to DOD requirements for modernization of nuclear weapons systems. The second is to develop testing and diagnostic techniques which may allow the Research, Development, and Testing Complex to respond in a limited manner in these areas to see if testing can be curtailed or eliminated.

FRAGILITY ANALYSIS

Senator **Exon**. I understand that the analysis of modernization needs was based on something you call a "fragility analysis." Can you please explain what this means and how it affects DOE's defense facilities?

Mr. **Wade**. A comprehensive fragility assessment is an evaluation of the fragility of plant operations, in terms of overall physical condition (aging), technological status (obsolescence), safeguards and security, and environmental, safety, and health conditions. Activities were segregated into separate products/processes families (blocks) listed on the attached table. Each of these separate blocks were assigned a fragility rating on a scale from 1 to 5. A rating of 1 was indicative that the project/process capability was currently in excellent condition and a rating of 5 was indicative of a serious condition. The evaluation produced a static, point-in-time fragility rating.

A composite rating for the weapons production complex indicates that it is at, or slightly above, expected industrial fragility. The composite assessment indicated that the current rating could be sustained with adequate capital funding during the next 20 years, but that, in the absence of capital funding, the weapons production complex would deteriorate rapidly to an unacceptable condition.

Parts of the materials production complex are in need of significant renovation. A discussion of this can be supplied in a classified annex.

Enclosure.

NUCLEAR WEAPONS COMPLEX PRODUCT/PROCESS CAPABILITY BLOCKS

Kansas City Plant

Integrated circuit fabrication, hybrid microcircuits, cables, printed wiring boards, firing sets, electronic assemblies (radars, times, etc.), arming, fusing and firing assemblies, mechanism machining and assembly, metal machining, metal fabrication and assembly plastics, and plastic machining and fabrication.

Mound Plant

Explosive component production:
- Detonators,
- timers,
- firing sets,
- pyrotechnics, and
- ceramics.

Boost systems: Milliwatt hardware, component evaluation operations surveillance, and nonweapons.

Oak Ridge Y-12

Enriched uranium, depleted uranium, lithium/components, cans, ceramics, and other materials.

INEL

HEU processing, defense waste (ICPP), defense waste (EG&G), site infrastructure, and site DP facilities.

FMPC

Chemical plants, UF_6/UF_4 reduction, metals plants, RMI extrusion, and waste remediation.

Pantex Plant

High explosive fabrication, new production, stockpile evaluation, stockpile maintenance, and development.

Pinellas Plant

Neutron generators, power sources, frequency devices, electromagnetic devices, and electromechanical components.

Rocky Flats Plant

Pit fabrication and assembly, nonplutonium pit components, beryllium components, reservoirs (J-items), forgings, and plutonium recovery.

Savannah River Plant

Reactor, fuel/target fabrication, F-canyon, FB-line, H-canyon, HB-line, tritium, solid waste, interim waste, long-term waste, tritium loading, tritium reclamation, and tritium recycle.

Hanford

N reactor, fuel processing, Pu finishing, and defense waste.

CONTEMPORARY NUCLEAR SAFETY REQUIREMENTS

Senator **Exon**. The 2010 Report states that "contemporary nuclear safety requirements developed for commercial power plants are being adopted for DOE use." Can you explain precisely what this means? Are "contemporary nuclear safety requirements" as detailed as NRC regulations, or does this refer only to general standards? Who will oversee the implementation of these "commercial nuclear safety requirements?"

Mr. **Wade**. The "contemporary nuclear safety requirements" are standards and guidances developed by the Nuclear Regulatory Commission for commercial nuclear facilities. The Department is reviewing these contemporary requirements for adoption to Department needs based on differences in design and operations of facilities in the nuclear weapons complex. The standards are being developed by the Office of Environment, Safety and Health (EH). EH will also provide internal oversight of the implementation of these contemporary requirements by the line organizations. External oversight will be provided by the Advisory Committee on Nuclear Facility Safety and the Defense Nuclear Facilities Safety Board.

ENVIRONMENTAL RESTORATION

Senator **Exon**. How did the 2010 Report arrive at recommendation of spending on environmental restoration of $1 billion per year by fiscal year 1995 and $2 billion per year by fiscal year 2000? Will this level of expenditure be sufficient to clean up all environmental contamination at DOE defense sites? If not, what will remain after 2010? Also, can you please explain the difference, if any, between environmental restoration, environmental compliance, and waste disposal?

Mr. **Wade**. The Modernization Report proposal for environmental restoration was formulated based on several factors: (1) current status of activities to address environmental contamination mainly in the assessment stage rather in the more costly cleanup stage; (2) need to develop a management structure to assure adequacy of characterization and assessment documentation and efficiency of implementing remedial actions; (3) availability of technolgy to address some of the unique problems associated with the nuclear weapons complex; and (4) budget reality. The intent is to develop a realistic, credible, and stable program to address environmental cleanup and decontamination and decommissioning (D&D) needs.

The Modernization Report proposal is to ramp-up funding for environmental restoration from the current funding level of $159 million, to $1 billion in fiscal year 1995, to $2 billion in fiscal year 2000, and level funding until addressing all environmental cleanup and D&D needs. The Report recognizes that environmental needs will extend beyond 2010. It is our judgment that the Department would have completed environmental cleanup at a majority of the nuclear weapons complex sites, with the exception of the more difficult sites such as the Hanford site. D&D activities, however, will continue to address currently operating facilities shutdown as the Nation modernizes the nuclear weapons complex facilities.

Environmental restoration is a DOE program to address environmental cleanup and D&D of inactive facilities in the nuclear weapons complex. Environmental compliance is a general term intended to cover compliance with applicable environmental regulations at any DOE facility necessary for on-going facility operations. Waste disposal refers to disposal of waste, radioactive, nonradioactive and mixed, in accordance with applicable requirements and standards.

DECONTAMINATION AND DECOMMISSIONING COSTS

Senator **Exon**. To what extent are decontamination and decommissioning costs included in the 2010 Report? How would you compare the urgency of decontaminating obsolete facilities with restoring contaminated sites?

Mr. **Wade**. The Modernization Report includes more than $5 billion in the Environmental Restoration Program to address D&D of inactive facilities. The Department's needs for D&D were developed based on facilities that are currently inactive or have definite plans to be inactive in the foreseeable future. As the Nation modernizes the nuclear weapons complex, some of the currently operating facilities will become inactive, requiring D&D. Recognizing that a majority of the facilities in the nuclear weapons complex are involved in handling of radioactive or hazardous materials, the ultimate cost for D&D will be higher than the current estimates of $3–4 billion.

The environmental cleanup and D&D needs are treated with equal priority with a proposed credible and stable program to address these needs.

PLUTONIUM INFRASTRUCTURE

Senator **Exon**. The 2010 study finds that a new plutonium infrastructure at Savannah River and new uranium facilities at the Y-12 plant at Oak Ridge are "essential" activities of the modernization plan. What is the need, other than as a contingency, for these new capabilities?

Mr. **Wade**. Regarding the continuing need for the plutonium infrastructure at Savannah River, it is impossible to predict accurately at this time whether additional plutonium will or will not be required beyond the year 2000. However, both DOD and DOE believe that a continuing capability to produce virgin (new) plutonium should be available in case such a need develops, especially if this capability could be provided at a reasonable cost. Such a need could develop, for example, as a consequence of an escalation in the Soviet threat, such as an ABM Treaty breakout, or as a consequence of weapon design improvements requiring more plutonium per warhead.

The proposed new heavy water reactor (HWR) at Savannah River will have the capability to efficiently produce limited quantities of weapon-grade plutonium. With the proposed Modular High Temperature Gas Cooled Reactor (MHTGR) at the Idaho site, the combination of the two NPRs could meet the future tritium requirements with excess capacity available from the HWR to make plutonium. This long-term capability can be provided at a relatively low cost because of the existing plutonium processing infrastructure already in place at Savannah River. What will be required is reconfiguring and modernizing this basic infrastructure so that it will be able to more efficiently meet the changing mission requirements. One strategy for accomplishing this, as identified in the Modernization Report, would be to consolidate operations from the two existing spent fuel and target reprocessing and finishing areas at Savannah River into facilities in a single area. This infrastructure would provide the complex with the flexibility to adapt to changing requirements with minimal impact on schedule and costs. Furthermore, in addition to providing the processing capability for plutonium made in the new HWR, the modernized Savannah River plutonium infrastructure, if needed, could continue to support the Rocky Flats Plant (RFP) in the recovery and recycle of plutonium plant is established at one of the large DOE production sites.

The uranium facilities at the Y-12 Plant are an essential part of the nuclear weapons production complex. These facilities provide for uranium weapon component fabrication and uranium recycle and recovery and will be needed as long as the United States has a nuclear arsenal. These facilities, which are 25 to 35 years old, require extensive modernization in the form of upgrades, equipment retrofits, and facility replacement to be able to meet future mission needs in a safe and secure manner.

QUESTIONS SUBMITTED BY SENATOR STROM THURMOND

STOCKPILE ASSUMPTION

Senator **Thurmond**. Without getting into classified matters, how would you summarize the stockpile assumption that underlies the modernization study?

Mr. **Wade**. The stockpile assumption was a given number of weapons in the stockpile and a specified annual production rate. This was the starting point for the modernization study. Based on these assumptions, the modernization study recommended the overall size, productive capacity, technology base and investment strategy necessary to meet the assumed requirements.

MODERNIZING THE COMPLEX

Senator **Thurmond**. Mr. Wade's testimony indicates that a principal need for modernizing the complex was complying with environmental, safety and health requirements. How were these requirements baselined in the modernization study, and should we not expect these requirements to change over time?

Mr. **Wade**. The Modernization Report's environment, safety, and health analysis was based on the "needs" identified in the report, *Environment, Safety and Health Needs of the Department of Energy Defense Complex,* issued in July 1988. The basic approach is to address environment, safety, and health concerns critical to production assurance.

The Modernization Study did consider possible changes in environment, safety, and health requirements and incorporated some flexibility to address potential future requirements.

MAINTAINING NUCLEAR WEAPONS TECHNOLOGICAL SUPERIORITY

Senator **THURMOND**. How did the need to maintain nuclear weapons technological superiority translate into specific recommendations of the modernization study?

Mr. **WADE**. Specific recommendations of the Modernization Study to support the need to maintain nuclear weapons technological superiority focused on recovering from losses in both manpower and nuclear tests conducted in recent years and preparing for an uncertain future.

The Research, Development, and Testing (RD&T) complex will need to continue to fulfill its primary mission of modernizing the nuclear stockpile to meet DOD requirements and to sustain an effective and credible nuclear deterrent. Emphasis will need to be placed on exploring technological limits of evolving nuclear weapons technology, improving the U.S. defense posture, reducing the impact of new weapon technology developed by adversaries, and assessing the impact of potential limitations of nuclear test restrictions and arms control. The modernization study recommends spending $8.2 billion above current spending levels for RD&T and operating expenses and an additional $3.4 billion for capital investment. Thus, the recommendations made in the RD&T area were fashioned such that technological superiority can be maintained.

MODERNIZATION PLAN

Senator **THURMOND**. How does the modernization plan provide the flexibility to adapt to changing production and technological needs?

Mr. **WADE**. The principal of flexibility has been an inherent consideration in the planning and operations of the nuclear weapons complex. Flexibility has been characterized as the ability to accommodate changing weapons productions demands, the ability to produce a mix of plutonium and tritium and other isotopes, the capability to expand the weapons technology base and to respond to the challenges of DOD mission requirements, the ability to test advanced designs of devices, and to utilize the expertise and capabilities of private enterprise particularly in some aspects of weapons manufacture.

The Modernization Plan continues the application of this principal of flexibility in several ways: (1) by the two production reactor strategy, one utilizing proven technology and the other utilizing a more advanced but less developed technology, and (2) in the Special Isotope Separation (SIS) Project which provides the flexibility needed to more assuredly meet potential plutonium demands by converting available fuel-grade plutonium to weapon-grade plutonium. SIS also has the potential for isolating and purifying other isotopes of plutonium as may be needed.

Within the parameters of future demand guidance, the nuclear weapons complex will be able to adjust workloads and outputs given reasonable lead times. One of the principal strengths of the modernized weapons complex is the weapons technological base including state-of-the-art laboratories and equipment and a nuclear testing program and facilities to maintain technological superiority and meet the challenges of changing applications.

RELATIONSHIP BETWEEN SIZING

Senator **THURMOND**. Is there any relationship between the sizing of the complex under the modernization study, and any arms control scenario?

Mr. **WADE**. There is no direct relationship between the sizing of the complex and any arms control scenario. The sizing of the RD&T effort is a function of the number of *types* of weapons, not of the number of weapons. The sizing of nuclear materials and nuclear materials production was determined by the capacity requirements developed by the Nuclear Weapons Council. All signed and ratified treaties were included in the process.

REDUNDANCY IN WEAPONS COMPLEX

Senator **THURMOND**. You note in your testimony that redundancy in the weapons complex has been reduced over the years. Where is there redundancy in the complex today, and to what degree is redundancy a factor in the modernization recommendations?

Mr. **WADE**. Little redundancy in the nuclear weapons complex exists today for major facilities operations and geographic locations. For example, there is one assembly plant, one plutonium weapons components fabrication facility, one uranium weapons components fabrication facility, and one reactor feed materials facility. There still remains, in principal, some reactor site redundancy considering the N Reactor (standdown status) and supporting infrastructure at the Hanford site and the three heavy-water reactors (currently shut down for safety upgrades) and supporting facilities at the Savannah River site.

Redundancy also exists in some systems of a lesser magnitude but also of significant importance such as scrap recovery. That is, plutonium scrap recovery capability, in addition to the Rocky Flats Plant, exists at Hanford, Los Alamos, and Savannah River.

Redundancy was considered in developing the Modernization Study. The findings and recommendations of the report reflect assessments of costs, security threats, resource constraints, and performance capability relative to the need for redundancy in the major elements of the system.

With the exception of new production reactor systems, a modernized reliable complex can be achieved without incorporating significant redundancy of major systems. In the two-reactor, two-site acquisition strategy for new production reactor capacity, Secretary Herrington noted that a steady, reliable supply of tritium and plutonium is a necessity to nuclear deterrent. This two-reactor, two-site strategy provides the increased assurances that the necessary capacity will be available on schedule and that no single external event or generic technical issue can cause a total shutdown of the critical tritium supply.

PRIORITIZING REQUIREMENTS

Senator **THURMOND**. Has the Department identified and prioritized those environmental, safety and health requirements that have the potential to shut down key facilities in the next 5 years? Does the budget that is before us contain the resources needed address these requirements? What are the resource requirements necessary to avoid plant shutdowns over the next 5 years?

Mr. **WADE**. As a part of the Department's Environmental Survey, a preliminary ranking of major environmental problems is presented in a report, *Environmental Survey Preliminary Summary Report of the Defense Production Facilities,* issued in November 1988. This preliminary ranking, together with cost estimates identified in the two "Needs" reports, will be used by the Department in developing long-range plans to address environment, safety, and health needs. The long-range planning process will be a systematic process to assure that critical facility needs are identified in a timely manner and that corrective actions are budgeted to avoid impact on facility operations. Currently, critical environment, safety, and health requirements are identified by ongoing assessment activities such as the Environmental Survey and the Technical Safety Appraisals, and corrective actions implemented as necessary to maintain facility operations to the extend possible.

There is an enormous backing of ES&H requirements which must be addressed in the long term. The fiscal year 1990 budget provides a major step in meeting those needs and should adequately address the near-term, high priority items. For example, funding for the cleanup of inactive waste sites and other areas of environmental contamination has been increased from $159 million in fiscal year 1989 to $401 million in fiscal year 1990.

The Department has identified its ES&H needs in the December 1988 report to Congress entitled, *Environment, Safety and Health Needs of the U.S. Department of Energy.* These needs mostly reflect resources required to comply with applicable federal environmental laws, DOE ES&H Orders, and other applicable ES&H requirements that could jeopardize operations if not met. Specific funding by fiscal year is being addressed each year as part of the budget process.

PIECEMEAL SOLUTIONS

Senator **THURMOND**. What assurances can you give the committee that the modernization plan does not continue piecemeal solutions to environmental, safety, health and waste disposal problems?

Mr. **WADE**. The modernization plan provides the long-range goal whereby overall environmental, safety, and health needs can be identified and addressed in a planned, systematic approach rather than in piecemeal fashion. However, prioritization and integration of critical environment, safety, and health needs will depend upon implementation of a planning process.

TECHNICAL COMPETENCE

Senator **Thurmond**. To what extent is the maintenance of technical competence and technological superiority facility related? How is the requirement to maintain technical competence translated into the recommendations of the modernization study?

Mr. **Wade**. The modernized RD&T complex will reflect new, multi-purpose facilities to maintain the high level of expertise required to execute the mission in the face of an uncertain future. Major facilities will be shared by the laboratories, providing the capability for expanding the knowledge of weapons as well as contributing to nationally important objectives. An annual appropriation of approximately four percent of the estimated replacement value of capital assets will permit the replacement of facilities and equipment to deal with problems of obsolescense, age, and changing regulations and standards.

The ability to support a viable nuclear deterrent depends on a workforce of highly skilled and experienced scientists, engineers, technicians, and support personnel as well as adequate facilities to support them. Maintenance of technical competence and technological superiority consists of the maintenance of scientific and engineering capabilities, the operation of technical facilities, and the pursuit of basic research and weapons supporting research. The specific objectives of the program are: (1) to provide in-depth scientific expertise and knowledge in areas of weapon science, (2) to provide access to the scientific community, (3) to help recruit, develop, and retain top quality scientists, and (4) to perform high quality research in the principal scientific and engineering disciplines which underlie the programs. In many cases, this research is unique and not found elsewhere in the scientific community.

SPECIAL ISOTOPE SEPARATION FACILITY

Senator **Thurmond**. The Special Isotope Separation facility is listed in your testimony as time critical and essential. Could you provide the committee the requirements that support that judgment?

Mr. **Wade**. Integral to the Department of Energy's mission to provide nuclear materials for use in defense applications is the responsibility to meet near-term demands for plutonium and to be prepared to supply that material as future demands develop. The short-term plutonium supply is adequate. Projections show, however, that the margin of error will shrink as we approach the mid-1990s. For the period 1995 through 2005, plutonium supply vulnerability will be the greatest. During that period, the Special Isotope Separation (SIS) could possibly be the Nation's only source of weapon-grade plutonium. Without it, unanticipated increases in plutonium demand could either go unmet or have to be provided through premature retirement of weapons systems. The SIS production facility is considered to be time critical and essential because unless the project is fully supported now, the plant will not be available during the period of greatest vulnerability to plutonium supply.

CLOSING OF FACILITIES

Senator **Thurmond**. The modernization study puts off until the future the closing of facilities that are no longer needed or need to be relocated. Are there potential benefits to be realized, including cost avoidance associated with capital improvements and operations, if these closeout actions could be accelerated? Is the delay in these actions a matter of resource availability in the near term, or is there some other reason?

Mr. **Wade**. The Modernization Study identifies a modernization plan which incorporates the shutdown or relocation of three major facilities and/or sites. It is recommended that the nuclear materials production facilities be phased out at the Hanford site since the Hanford site will not have a nuclear materials production mission beyond the time that N Reactor is removed from cold standby. However, there is a quantity of N Reactor fuel and plutonium that should be processed through the PUREX Plant and the Plutonium Finishing Plant which is projected to require 4 to 5 years followed by the phaseout of all materials production facilities to effect cost savings. Waste management activities would continue. This period of time coincides with the time in which it is recommended that N Reactor be maintained in cold standby as a contingency tritium supply source.

The Rocky Flats Plant (RFP) relocation schedule reflects a consideration of a number of activities necessary to effect an orderly transfer of functions to a new location. These major activities include the preparation of an Environmental Impact Statement (EIS), site selection, technology development, design, construction, testing, and a period of operation for qualification and certification of the new facility to assure the reliability of meeting schedules and product quality. The development of an EIS and site selection may require up to three years. Some activities such as technology development and preliminary designs can be carried on in parallel to some extent. Construction may require up to eight years followed by up to two years of testing. The transaction period (qualifications and certifications) will require up to four years. With consideration of some contingency in the estimates, the schedule could extend to a total of between 15 and 20 years. Most of the major activities are sequential in nature. However, as technology and designs are developed, there may be opportunities to accelerate the time required for the RFP relocation.

The Feed Materials Production Center (FMPC) at Fernald, Ohio, is recommended for closeout in the early 1990s. Consideration should be given to preproduction of depleted uranium materials for military and nuclear material production programs. Remaining workload should be relocated to other DOE installations, such as the Y-12 Plant at Oak Ridge, or contracted with a commercial vendor. More definitive analysis of options for relocation of FMPC functions will identify those activities which can be terminated commensurate with the availability of a new certified source of uranium.

PROPOSED FUNDING RAMP

Senator **Thurmond**. What is the basis for the proposed funding ramp up from $160 million in fiscal year 1989 to $1 billion in 1995 to $2 billion by fiscal year 2000 for environmental restoration needs? How do you respond to the critics who argue that the $315 million in this year's budget is too little?

Mr. **Wade**. The Modernization Report proposal for environmental restoration was formulated based on several factors: (1) current status of activities to address environmental contamination mainly in the assessment stage rather in the more costly cleanup stage; (2) need to develop management structure to assure adequacy of characterization and assessment documentation and efficiency of implementing remedial actions; (3) availability of technology to address some of the unique problems associated with the nuclear weapons complex; and (4) budget reality. The intent is to develop a realistic, credible, and stable program to address environmental cleanup and decontamination and decommissioning (D&D) needs.

The Modernization Report proposal is to ramp-up funding for environmental restoration from the current funding level of $159 million, to $1 billion in fiscal year 1995, to $2 billion in fiscal year 2000, and level funding until addressing all environmental cleanup and D&D needs. The Report recognizes that enviromental needs will extend beyond 2010. It is our judgment that the Department would have completed environmental cleanup at a majority of the nuclear weapons complex sites, with the exception of the more difficult sites such as the Hanford site. D&D activities, however, will continue to address currently operating facilities shutdown as the Nation modernizes the nuclear weapons complex facilities.

The amended budget for fiscal year 1990 provides for $401 million for environmental cleanup. This is an appropriate amount while we are in the characterization stage. Increases may have to be requested in future year budgets depending on our intended site-by-site characterization and prioritization efforts.

Questions Submitted by Senator Malcolm Wallop

TWO REACTOR STRATEGY

Senator **Wallop**. In August, Secretary Herrington recommended to Congress a two reactor strategy to replace the three reactors at the Savannah River Plant that are presently not operating due to safety and environmental concerns the recommendation called for a Heavy Water Reactor (HWR) to be built at Savannah River and concurrent construction of the Modular High Temperature Gas-Cooled Reactor (MHTGR) at the Idaho National Engineering Laboratory. That recommendation was based on conclusions of a panel of the Energy Research Advisory Board, which made a strong argument for duality and diversity in our material production capability.

Could you tell me if the Department of Defense (DOD) has taken a position on this issue of duality, and if so, what is the Department's position?

Mr. **Wade**. As you are aware, in the process of developing a preferred strategy concerning New Production Reactor (NPR) capacity, the Deparatment of Energy (DOE) consulted with the Nuclear Weapons Council and DOD. The protection afforded by two sites and two technologies against the simultaneous loss of all production capacity, whether caused by naturally occurring events, regulatory concerns, technology problems, sabotage, or strikes, is a fundamental part of the DOE strategy. DOD strongly supports this approach as the most likely to provide an assured supply of tritium.

HEAVY WATER REACTOR

Senator **Wallop**. DOE's modernization study shows both the HWR and the High Temperature Gas-Cooled Reactor (HTGR) following the same time line for completion. It would seem to me that the HWR is a known technology and should move ahead faster than the advanced technology that might need additional development. However, I understand that is not the case. I have been informed that the design for the HWR is, at best, preconceptual, while the HTGR is more advanced? Is that information correct? Therefore, a concurrent effort on the two reactors will not delay the HWR. Is that the case?

Mr. **Wade**. The HWR has successfully supplied nuclear materials to meet the nation's defense program needs for over 30 years. The technology and operating experience accumulated over this time period will be merged with the reactor technology and operating experience of the commercial nuclear power industry to increase confidence in the design, construction, and operation of the HWR. The detailed design for the HWR has not been initiated. The MHTGR design is based on a less mature technology and operating background. DOE is approximately 20 percent complete in its commercial MHTGR design efforts. Part of that information will be useful in the NPR design. However, since the requirements and the mission for the NPR are different, some of the designs will have to be tailored to meet NPR needs. There is substantial design work ahead for both technologies.

In our schedule, we have taken into account the uncertainties described above and believe that the concurrent development of the HWR and the MHTGR is the correct strategic approach and that the HWR will not be delayed.

LIFE-LIMITING FACTORS

Senator **Wallop**. For a number of years, the Department stated that there were no known life-limiting factors associated with the Savannah River reactors. Has any of the information gathered to date on these facilities, from reviews conducted by DOE's Environment, Safety and Health Office, the Advisory Committee on Reactor Safety or the National Academy of Sciences proven or disproven this assertion?

Mr. **Wade**. The National Academy of Sciences concluded the production reactors, including the Savannah River reactors, all display symptoms of acute aging that could affect safety and are likely to limit the useful lives of these reactors. The Savannah River reactors were built in the 1950's and have experienced material aging brought on by irradiation and corrosion. However, the Department has no hard evidence that material aging at the reactors is now life-limiting. Stress corrosion cracking of the stainless steel piping system has been detected at the Savannah River reactor. Several sections of reactor coolant piping have been replaced after cracks of varying depths in pipe walls were found by ultrasonic testing. Through piping replacement, these cracks have not been life-limiting.

Stress corrosion cracking in irreplaceable components, such as the reactor tank, would be life-limiting. The C Reactor was shutdown in 1985 as a result of cracks in the "knuckle" region of the reactor tank. Since then the reactor has remained shutdown permanently. The P, K, and L Reactors are also susceptible to stress corrosion cracking, but were designed without the C Reactor knuckle that failed. The Savannah River contractor is upgrading the inspection program to detect cracking at the P, K, and L Reactors. This includes modifying commercially available ultrasonic testing equipment and developing techniques for use at the Savannah River reactors. In addition, the operating contractor is developing technology for repairing the reactor tanks if any cracks are found by ultrasonic testing. If any such cracks are found that could not be repaired, they could become a life-limiting factor. The Department is pursuing the ultrasonic testing program as expeditiously as possible during the current outage.

SPECIAL ISOTOPE SEPARATION FACILITY

Senator **Wallop**. Priority one of the Modernization Study includes the Special Isotope Separation facility on the time line labeled, "Time Critical and Essential." This facility will be used, I am informed, to purify fuel-grade plutonium for weapons. Please explain why this facility is "critical and essential," given the often stated fact that this Nation has plenty of plutonium.

Mr. WADE. The short-term plutonium supply is adequate. Projections show, however, that the margin for error will shrink as we approach the mid-1990s. The vulnerability of our plutonium supply will be the greatest from 1995 through the year 2005. As a result, the SIS production facility is considered to be time critical and essential; unless the project is fully supported now, the plant will not be available during the period of greatest vulnerability to plutonium supply.

QUESTIONS SUBMITTED BY SENATOR SLADE GORTON

IN-HOUSE TECHNICAL EXPERTISE

Senator GORTON. I trust you relied heavily on the Department of Energy's (DOE's) in-house technical expertise in evaluating the WNP-1 option. Did you take into account the General Accounting Office (GAO) evaluation of this option?

Mr. WADE. The initial DOE evaluation of WNP-1 was conducted by DOE technical staff, augmented by National Laboratory and industrial technical expertise. WNP-1 was also evaluated, along with other candidate NPR technologies, by the independent Energy Research Advisory Board. Additionally, GAO conducted two studies of the WNP-1 option in 1988. GAO reports on these activities were not available to DOE until September 1988, well after the Secretary's decision. GAO is conducting additional studies regarding the New Production Reactor (NPR) program, including: the process for selecting the preferred technologies; WNP-1 institutional issues; and the utilization of accelerator systems for tritium production. The accelerator study will be issued in about 3 months and the NPR report is scheduled for late fiscal year 1989.

WNP-1

Senator GORTON. To what degree was WNP-1 related to a contingency option in response to your understanding of the historical political environment in Washington State?

Mr. WADE. There were a number of factors which caused WNP-1 to be considered a contingency option. The Energy Research and Advisory Board (ERAB) pointed out that substantial technical work was needed on the use of higher enriched fuel and development and testing of a prototype tritium target suitable for a Light Water Reactor (LWR). The ERAB also noted institutional uncertainties which could have a major impact on the cost and schedule risks of acquiring the plant. In addition to these factors, former Energy Secretary Herrington in an August 3, 1988, Press Conference stated: ". . . the uncertainty caused by the strong political division in the Northwest, especially in the State of Washington. . . ." was another factor.

TRITIUM

Senator GORTON. What role do you think politics should play in assuring an adequate supply of essential materials, such as tritium?

Mr. WADE. The assurance of an adequate supply of tritium, or other essential materials for the Nation's nuclear weapons stockpile, should be driven by National Security needs and technical capabilities. Politics should play no role. The fulfillment of our national defense missions and the energy and environment goals of the Department are mutually compatible objectives. We should not compromise the national security needs of the Nation.

TRITIUM REQUIREMENTS

Senator GORTON. Are you confident enough of the scenario outlined in the 2010 Report that you are not looking at interim options to meet our near-term tritium requirements?

Mr. WADE. The highest priority in planning for modernization of the Office of Nuclear Materials Production facilities is allotted to assurance of an uninterrupted tritium supply, including provision for a tritium contingency. This is attributable to the radioactive decay character of the radioisotope and its impact on the Nation's nuclear deterrent capability.

Modernization will require renovating and retrofitting existing tritium production facilities at SRP until they are replaced with a new production reactor capable of ensuring an uninterrupted supply of tritium for long-term support of the stockpile.

Notwithstanding the latter, to mitigate any near-term limitations on the production of base quantities of tritium at the Savannah River Plant's production reactors, the Department has been evaluating other contingency tritium production options including that of removing N Reactor from cold standby for a near-term tritium mission.

CONTINGENCY OPTIONS

Senator **Gorton**. If you have considered contingency options, what are they?

Mr. **Wade**. The diverse tritium production contingency alternatives that have been evaluated include:

1. N Reactor tritium production;
2. Fast Flux Test Facility (FFTF) production of tritium;
3. Detritiation of existing irradiated heavy-water D_2O inventory;
4. Washington Nuclear Plant-1 (WNP-1) acquisition and conversion; and
5. Restoration of C Reactor.

Table 1 summarizes the alternatives relative to selection criteria use for the evaluations. All candidates were assumed to be capable of complying with applicable environmental, safety, and health criteria. The attendant pros and cons of the alternatives are presented in tables 2 through 6, respectively.

The preliminary schedules for new production reactor (NPR) capacity indicate that new reactors could be on-line in about 10 years. The option of using an accelerator to produce tritium cannot likely be implemented sooner than a new reactor. We understand that at least 4 years of development and demonstration work as needed to confirm concept feasibility of large scale tritium production. Proponents have estimated that approximately an additional 5 years would be required for construction, provided the research and development is successful.

Two other obvious options exist, i.e., use of existing commercial light water reactors and obtaining tritium from foreign governments. With regard to commercial light water reactors, we anticipate that technical problems pertaining to target elements exist, similar to those involved with WNP-1. In addition, there are very serious institutional and national policy issues involved with this option. With regard to foreign sources, although some informal staff level discussions have been held with our allies to review issues of purchasing tritium, no formal discussions for the purchase of tritium have been held with foreign governments, nor proposals made.

N Reactor is the favored alternative as a large capacity tritium production contingeny. The large capacity of the reactor allows flexibility in Savannah River Plant (SRP) operating schedule during parallel operation and could provide replacement capacity in the event of serious SRP disruptions. N Reactor production capacity and the proposed implementation schedule (4 years to routine product delivery including EIS preparation) is the shortest of the large capacity alternatives. The N Reactor underwent extensive safety reviews prior to transition to cold standby status and most physical upgrades were completed. The basic N Reactor tritium production technology was demonstrated in the 1960's during the Coproduct Demonstration Program. Further analysis, design, and demonstration would be required to optimize the processes but these can be addressed within the proposed schedule. The remaining reactor life in a tritium production mode is about 9 years of operation which will allow a margin for NPR deployment.

Because the other large capacity alternatives, e.g. WNP-1, would take longer to go into production, choosing one of them would result in larger tritium shortfalls which would not be offset by the anticipated increases in production capacity over N Reactor. The long-term high capacity alternatives are appropriate NPR options rather than near-term production contingencies. The balance of the alternatives are limited by their available inventory, annual capacity and/or implementation schedules.

Table 1: Alternative Comparison Matrix

	Criteria				
Option	Estimated Time to Tritium Delivery (yr)	Relative Technical Maturity	Implementation Cost ($M)	Incremental Operating Cost ($M/Yr)	Comments
N Reactor needed	4	Med-High	450*	120	Fuel and target design changes
FFTF development	6	Medium	150	100	Fuel and target design and needed
Detritiation	5-8	High	90	10	Acceleration of NPR activity would enhance benefit and reduce cost
WNP-1	7	Medium	2500-2900	150	Contingency in NPR strategy; 7 years to delivery is after acquisition
Restoration of C Reactor	5-10	Low	500+	150	Schedule and cost uncertainties

* Incremental costs only

Table 2: N Reactor Tritium Production

Pros	Cons
o Large Capacity	o Schedule does not preclude shortfalls
o Short implementation schedule (4 years to first product)	o New Hanford materials production mission at N Reactor
o Tritium production technology has been demonstrated	o Modification of support facilities at RL, OR, and SRP required
o Byproduct power generation	o EIS required
	o New N Reactor fuel design

Table 3: FFTF Production of Tritium

Pros	Cons
o Existing modern test reactor	o Small capacity
o Low conversion cost ($150 million)	o Intermediate deployment schedule (6 years)
o Availability of reactor	o Target technology not demonstrated

Table 4: Detritiation of D_2O

Pros	Cons
o New facility already included in NPR scope	o Small capacity
o To be included in NPR EIS	o Small total inventory recoverable
o Low capital cost (less than $90 million)	o Intermediate schedule (5-8 years)
o Established technology	
o Tritium available from D_2O	
o Action will reduce SRP personnel exposure	

Table 5: WNP-1 Acquisition and Conversion

Pros	Cons
o Large capacity	o High capital cost (approximately $2 billion to complete plus acquisition costs)
o Meets acknowledge commercial standards	o Intermediate schedule for product delivery (7 years after acquisition)
o Displace need for second, more expensive, NPR	o Target technology not demonstrated (being developed by NPR project)
o Long term production alternative	o Large construction project
o Byproduct power generation	o Institutional issues
o Self sustaining in standby as power generator	o EIS required

Table 6: Restoration of C Reactor

Pros	Cons
o Tritium production technology common to other SRP reactors	o Major decontamination and construction project
o Intermediate to high capacity dependent upon operating power level	o High degree of program schedule risk (schedule 5-10 years)
	o High cost and large program cost risk
	o Restored reactor would share common design issues with K, L, and P reactors
	o EIS required

ACTIVITY AT THE N-REACTOR

Senator **Gorton**. Have you considered an environmentally acceptable and safe resumption of activity at the N-reactor to meet tritium needs through the end of the century?

Mr. **Wade**. The Department is reviewing the viability of using N Reactor for tritium production. N Reactor is the only short term (3-4 years) contingency to the Savannah River reactors. At this time, no decision has been made to actively pursue this option.

[Whereupon, at 4:41 p.m., the committee adjourned, to reconvene upon the call of the Chair.]

SAFETY, MODERNIZATION, AND ENVIRONMENTAL CLEANUP OF THE U.S. NUCLEAR WEAPONS COMPLEX

THURSDAY, MARCH 2, 1989

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

NUCLEAR MATERIALS REQUIREMENTS BY THE NUCLEAR WEAPONS COUNCIL

The committee met in executive session, pursuant to notice, at 9:35 a.m., in room SR-222, Russell Senate Office Building, Senator J. James Exon presiding.

Committee members present: Senators Exon, Dixon, Glenn, Warner, Thurmond, and Gorton.

Professional staff members present: Sherri W. Goodman and William E. Hoehn, Jr.

Minority staff member present: Robert F. Bott, professional staff member.

Staff assistant present: Mickie Jan Wise.

Committee members' assistants present: Jeffrey B. Subko, assistant to Senator Exon, Christopher E. Paine, assistant to Senator Kennedy; Edward M. McGaffigan, Jr., assistant to Senator Bingaman; Milton D. Beach, assistant to Senator Glenn; Kevin T. Knobloch, assistant to Senator Wirth; Mark J. Albrecht, assistant to Senator Wilson.

Others present: Len Weiss, Senate Governmental Affairs Committee.

OPENING STATEMENT OF SENATOR J. JAMES EXON, PRESIDING

Senator EXON. The committee will please come to order.

Due to an important prior commitment that Senator Thurmond has, I am glad to recognize him at this time. He can either come back when he finishes his other commitment, or he can submit his questioning for the record.

Senator Thurmond.

Senator THURMOND. Thank you very much, Mr. Chairman. I appreciate your usual courtesy.

I have to go to another committee meeting, but I will take pleasure in reading the testimony of today's witnesses later.

I want to thank you gentlemen for coming. We appreciate your being here this morning and appreciate what you are doing.

Senator EXON. Let me interrupt for just a moment.

I ask staff to make sure that the room is fully cleared, pursuant to the level of security that is required for our meeting this morning.

Mr. **Hoehn**. Yes, we are. Everyone here has the appropriate clearances, Senator.

Senator **Exon**. Thank you.

Senator Thurmond.

Senator **Thurmond**. I am very glad to see Dr. Duncan, Mr. Troy Wade, and General Herres. We appreciate your being here to respond to our questions.

As we heard last month from Mr. Wade and other witnesses, the prospects for early restart of the production reactors at the Savannah River plant are not reassuring. That would certainly seem to be the case with respect to restarting even one reactor before the end of 1989.

It is, therefore, with a great deal of interest, and I must confess, some apprehension, that we will hear the highly sensitive national security side of the issue this morning. It will be most important that this committee take away from this hearing a rather detailed understanding of tritium requirements.

Specifically, we will need to understand exactly when the tritium problem begins to impede our modernization efforts and our ability to maintain the existing stockpile.

Mr. Chairman, I also look forward to hearing what alternatives there are by which we can use the limited supplies of existing tritium more effectively and more efficiently, and whether there are other sources that we can count on.

I have some questions, Mr. Chairman, and if I don't get back in time to ask them, if you would kindly propound those questions, I would appreciate it.

Senator **Exon**. I will do everything I can to cover whatever you want me to.

Senator **Thurmond**. Thank you.

Senator **Exon**. Thank you very much for your contribution.

Today, the full committee meets in closed session to receive testimony on the requirements for nuclear materials, especially for tritium. This is a sensitive and highly classified subject, since the starting point for the requirements is the nuclear weapons stockpile, which, under the Atomic Energy Act, the President himself must determine annually.

Given the authorized stockpile, the need for nuclear materials can be calculated, taking into account the weapons and materials on hand, the retirements and recovery of materials planned, and other factors. The requirements for new materials production can then be derived from those facts.

As we all know, the three tritium producing reactors at Savannah River were shut down for safety modifications and for operator retraining last year. Thus, we have been living off an inventory of previously produced tritium. And, as we all know, tritium decays and has to be replaced periodically.

Last month, this committee received testimony on the status of these three reactors. In a nutshell, that testimony strongly suggests not only that we do not have a firm date by which we can expect the reactors to be restarted and safely operated, but that it may be many months before such a date for a future restart can be established.

This is a situation that the committee and my subcommittee intend to follow very closely.

Our three witnesses today are the three members of the Nuclear Weapons Council: Dr. Robert C. Duncan, the chairman; Gen. Robert T. Herres, and Mr. Troy Wade.

Welcome to each and every one of you. We look forward to your very important testimony.

Gentlemen, as I have just noted, we are not sure when DOE can again begin making tritium. What we need to address in this hearing are the answers to several straightforward questions:

First, at what point in calendar time does the tritium supply problem begin to become critical—that is, begin to affect the stockpile of our nuclear weapons? Is it the end of this year, some time next year, or even later?

Second, what options are there to economize on tritium stocks, either through deletion of some weapon capabilities, [deleted] or through early retirement of some nuclear weapons? And, for each of these possible options, would we extend the critical date by weeks, or by months, or by years? Can this solve the [deleted] tritium problem?

Third, suppose we assume that, for one reason or another, the restart of the Savannah River reactors does not occur. What other options for domestic production of tritium are there and how long would it take to implement them? Can this solve the [deleted] tritium problem?

Fourth, again supposing no restart of Savannah River reactors, are there options for obtaining tritium from foreign sources, and, if available, would this solve the [deleted] tritium problem?

Finally, I would like to ask you collectively, is there any solution to the [deleted] tritium problem that does not require timely restart of the Savannah River reactors and their safe operation for roughly the next decade, until the first of the new production reactors is anticipated to go on line?

Gentlemen, that, in essence, is what today's hearing is all about.

I will ask you to summarize your prepared statements. Those prepared statements will be accepted, without objection, into the record as if delivered in full.

I have already asked my distinguished colleague, Senator Thurmond, to make his opening remarks, which he has. With that, I think we can move right into your testimony.

Dr. Duncan, I believe you have been selected to go first.

Once again, welcome.

Please proceed.

STATEMENT OF ROBERT C. DUNCAN, DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING, OFFICE OF THE SECRETARY OF DEFENSE, AND CHAIRMAN, NUCLEAR WEAPONS COUNCIL

Dr. **Duncan**. Thank you very much, Mr. Chairman.

The three of us will do our best during our presentations to cover the very important issues which you raised in your opening comments.

I want to thank you for inviting the Nuclear Weapons Council here today. My remarks will be followed by testimony by Mr. Troy Wade, Acting Assistant Secretary for Defense Programs in the Department of Energy. He is the Department of Energy member of the Nuclear Weapons Council.

Senator EXON. Excuse me for just a minute, Dr. Duncan.

[Pause.]

Senator EXON. Proceed, Doctor.

Dr. DUNCAN. Mr. Wade will discuss why tritium is necessary to modern weapon design and what contingencies the Department of Energy is pursuing to provide the required tritium.

Following Mr. Wade's remarks, General Herres, Vice Chairman of the Joint Chiefs of Staff, will discuss, in some detail, the stockpile requirements for tritium.

A dependable, noninterruptible supply of tritium is indispensible to the security of the United States. It is a necessity.

Nuclear deterrence remains at the heart of our national security policy, and that is not likely to change with arms reduction talks or with SDI.

As you know, tritium is the most critical of the weapons materials because it decays at a 5.5 percent annual rate.

I would like to spend a minute or two discussing how we developed the stockpile plan.

The annual nuclear weapons stockpile plan establishes the requirements for the mix and quantities of nuclear weapons and weapons materials. This plan is prepared annually by this Council, which consists of the three of us.

The Council forwards the plan to the Secretaries of Defense and Energy, who, in turn, review and jointly refer the document to the President for approval.

Preparation of the stockpile plan is a joint undertaking of the Office of the Secretary of Defense, the Joint Chiefs of Staff, with the inputs from the CINC's, the Commanders-in-Chief from around the world, the Department of Energy and the military services.

Firm military requirements are incorporated into the final product. The process which prescribes this Nation's nuclear weapons stockpile is sound, and produces the minimum weapons mix to support the nuclear deterrent portion of our national defense strategy.

Now, in preparing this year's plan, the Council verified that nuclear weapons [deleted]. In the Council's opinion, the stockpile plan [deleted].

The Council also agreed that [deleted].

The Council is very concerned [deleted].

In 1985, this Nation had five defense reactors in operation. Today we have none.

As a result [deleted].

The three reactors at the Savannah River plant are this Nation's only source of tritium at this time. It is absolutely critical that we get these three reactors safely restarted, and keep them in operation until a new generation of reactors comes on line to take their place.

Senator EXON. Dr. Duncan, let me interrupt you right there for a quick question.

This is one of the key questions. Do we need, in your opinion, all three of those reactors to meet our minimum requirements? I guess probably it depends. I have to speak here as a layman, who does not understand all of the technicalities that you have to pursue. But let's assume that we had one of those Savannah River reactors that could operate at 100 percent of capacity. I know that we are not going to run them at that, but just assume that we could. Would that get half of the minimum that we would need?

Do you get the thrust of my question?

Dr. DUNCAN. Yes, sir.

The answer to your question is we do need the reactors. Mr. Wade and General Herres will go into that in some detail, with charts to show what will happen, if you would be willing to wait.

Senator EXON. I would. It just struck me when you said what you did, and if you don't cover it in your statement, for the record, I would like to have your evaluation of that, in addition to the testimony that we will receive from our other witnesses today.

Dr. DUNCAN. Well, in short, to cover 100 percent of our requirements, we need [deleted].

Senator EXON. Thank you.

Dr. DUNCAN. The three reactors at Savannah River, at the Savannah River plant, are this Nation's only source of tritium. It is absolutely critical that we get these three reactors safely restarted and keep them in operation until a new generation of reactors comes on line to take their place. By all reasonable estimates, the new production reactor capability will not be available for at least 10 years.

Mr. Chairman and members of this committee, in our opinion, the fact that this country has no current tritium production is unacceptable. [Deleted.]

To assure tritium availability, your support is needed in three areas. First, in the near term, we must work together to facilitate the safe restart of the three reactors at Savannah River as soon as possible.

Second, given the fragility and unknown longevity of those reactors, national security considerations dictate that the two new production reactors recommended by the Secretary of Energy in August 1988, be acquired on an urgent timescale to replace the Savannah River reactors.

Third, since light water reactors may be the only alternate source of tritium in the mid-term, we recommend you approve the requested funding for the Secretary of Energy's recommended contingency to develop light water reactor targets.

We realize that for many reasons, tritium production in light water reactors is not desirable. However, it may become the only alternative to unilateral disarmament.

We thank you for the opportunity to address this committee on this important issue and solicit your support.

I would like to introduce Mr. Wade now, who will discuss the DOE contingencies to provide tritium.

Senator EXON. Thank you, Dr. Duncan.

[The prepared statement of Dr. Duncan follows:]

PREPARED STATEMENT BY ROBERT C. DUNCAN, DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING, OFFICE OF THE SECRETARY OF DEFENSE AND CHAIRMAN, NUCLEAR WEAPONS COUNCIL

Mr. Chairman and members of the committee, thank you for inviting the Nuclear Weapons Council [NWC] here today. As chairman of the NWC, I have a few opening remarks to make on behalf of the Council. My remarks will be followed by testimony by Mr. Wade, Acting Assistant Secretary for Defense Programs, Department of Energy [DOE] member, on why tritium is necessary to modern weapon design and what contingencies DOE is pursuing to provide the required tritium. Following Mr. Wade's remarks, General Herres, Vice Chairman, Joint Chiefs of Staff, will discuss the stockpile requirements for tritium.

A dependable, noninterruptable supply of tritium is indispensable to the security of the United States. Tritium production is not an option for this country—it is a necessity. The impact that a lack of tritium will have on our stockpile of nuclear weapons is of critical importance to our National Security.

America's post World War II defense strategy has been based on deterrence: our nuclear arsenal is the bedrock of this policy that has been successful for over four decades. Neither the prospect of a strategic defense system nor the prospects of arms reductions obviate the necessity to maintain an adequate nuclear deterrent force. Nuclear deterrence remains at the heart of our national security policy.

As you know, tritium is the most critical of the weapon materials because it decays at a 5.5 percent annual rate. Since literally one-half of the tritium in the stockpile decays away in 12 years, tritium needs to be periodically replenished in nuclear weapons to make them perform as designed.

The annual nuclear weapons stockpile plan establishes the requirements for the mix and quantities of nuclear weapons and weapon materials. The stockpile plan is prepared annually by this Council. The Council forwards the plan to the Secretaries of Defense and Energy, who in turn review and jointly refer the document to the President for approval. Preparation of the stockpile plan is a joint undertaking of the Office of the Secretary of Defense, the Joint Chiefs of Staff with CINC inputs, the DOE, and the military services. Firm military requirements are incorporated in the final product. The process which prescribes this Nation's nuclear weapons stockpile is sound and produces the minimum weapon mix to support the nuclear deterrent leg of our national defense strategy.

In preparing this year's stockpile plan, the Council [deleted].

The Council is very concerned, however, that [deleted].

In 1985, this Nation had five defense reactors in operation. Today, as we sit here, we have none. [Deleted]. The three reactors at the Savannah River plant are this Nation's only source of tritium. It is absolutely critical that we get these three reactors safely restarted, and keep them in operation until a new generation of reactors comes on line to take their place. By all reasonable estimates, the new production reactor capability will not be available for at least 10 years.

As my fellow council members will discuss, there is [deleted].

Despite earnest efforts by DOE, it it cannot assure DOD an uninterrupted supply of tritium. As I understand the situation right now, there is no reactor restart schedule, and there won't be a schedule until some time this spring. Uncertainties exist regarding the extent of plant fixes required by ongoing technical assessments of seismic capabilities, piping and reactor vessel integrity, and power levels.

[Deleted.]

Mr. Chairman, and members of this committee, in our opinion, the fact that this country has no current tritium production is unacceptable. [Deleted]. To assure tritium availability, your support is needed in three areas:

First, in the near-term we must work together to facilitate the safe restart of the three reactors at Savannah River as soon as possible.

Second, given the fragility and unknown longevity of the current reactors, national security considerations dictate that the two new production reactors recommended by the Secretary of Energy in August 1988, be acquired on an urgent time scale to replace the Savannah River reactors.

Third, since light water reactors may be the only technically credible alternate source of tritium in the mid-term, we recommend you approve the requested funding for the Secretary of Energy's recommended contingency to develop light water reactor targets.

We realize that for many reasons tritium production in light water reactors is not desirable; however, it may become the only mid-term alternative to unilateral disarmament.

Thank you for the opportunity to address the committee on this important issue. We solicit your support.

Senator **Exon**. We welcome you again, Mr. Wade. You may proceed.

STATEMENT OF TROY E. WADE II, ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS, DEPARTMENT OF ENERGY, AND MEMBER, NUCLEAR WEAPONS COUNCIL

Mr. **Wade**. Thank you, Mr. Chairman.

With your permission, I would like to proceed with a briefing which will discuss all three nuclear materials that are used in the U.S. stockpile today, and talk briefly about the supply of each one.

[Chart deleted.]

This is a picture of one of the three reactors at Savannah River. As Dr. Duncan has indicated, none is operating now.

We have gone from 14 to 5 to 0, in terms of our capacity at the moment.

Senator **Exon**. Troy, let me interrupt you before you leave that slide.

I have never been down there. I have been trying to get down there.

Were all three of these reactors brought on line at approximately the same time, or was there one, and then 3 years later another, and then 3 years later? Are they all about the same age?

Mr. **Wade**. They were all brought on-line about the same time, Senator Exon. One of the three existing reactors, the reactor we designate "L", was shut down for 17 years. It did not run for 17 years.

So, one can make the case that it is 17 years younger than its brothers. They all originally came on-line at about the same time.

Senator **Exon**. Thank you.

NUCLEAR MATERIALS USE

[Chart deleted.]

Mr. **Wade**. I will discuss very briefly tritium, plutonium and oralloy.

This is a cutaway of the W87 Peacekeeper, which shows the location of [deleted] in that particular reentry vehicle.

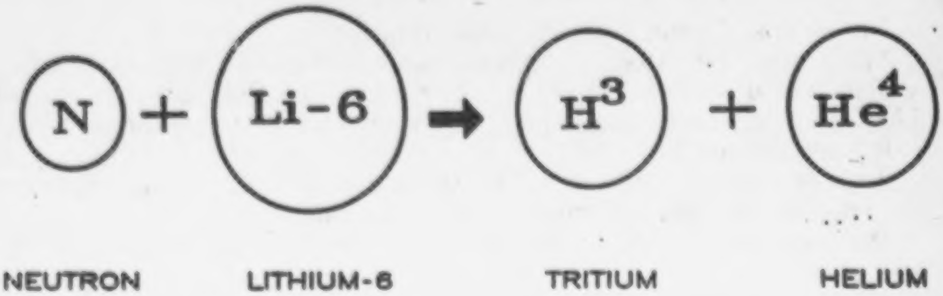
Defense Programs—Nuclear Materials

WHAT IS TRITIUM?

Rare isotope of hydrogen.
Produced in reactors.
Decays 50 percent every 12.3 years.

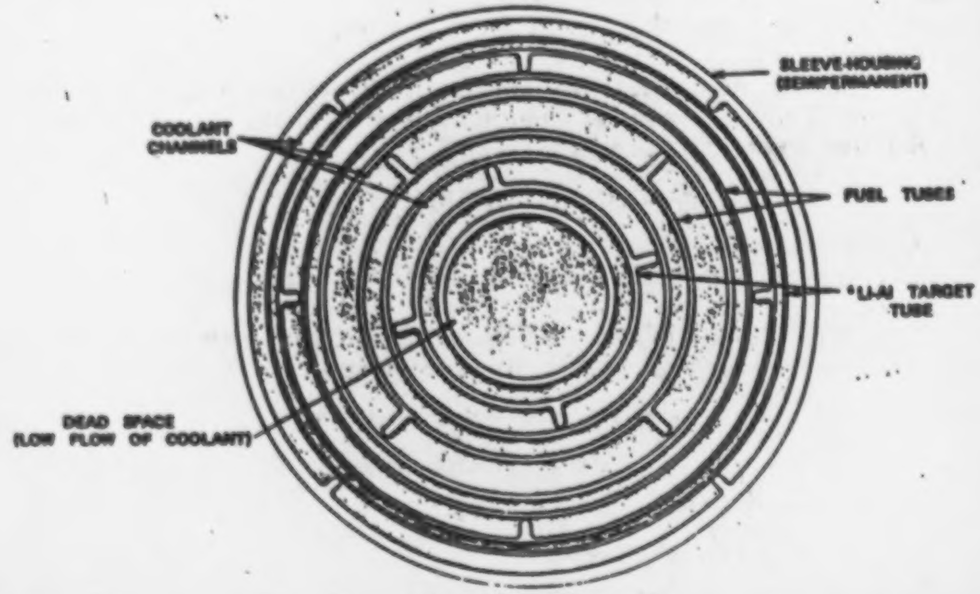
Tritium is an isotope of hydrogen. At the moment, the only U.S. capability to produce it in any quantity is in fission reactors. As had been stated, it decays. It has a half-life of 12.3 years. Fifty percent of it decays every 12 years.

HOW TRITIUM IS PRODUCED IN REACTORS


N
+
Li-6
H^3
+
He^4
NEUTRON
LITHIUM-6
TRITIUM
HELIUM

It is produced in a fission reactor, by bombarding a lithium target with a neutron, with the resulting products of tritium and helium.

MARK 22 CROSS SECTION


SLEEVE-HOUSING (SEMIPERMANENT)
COOLANT CHANNELS
FUEL TUBES
^{6}LI-AL TARGET TUBE
DEAD SPACE (LOW FLOW OF COOLANT)

This is a cross section of a fuel element used in the Savannah River reactors for the production of tritium. You see the lithium aluminum target tubes in the center there. The blue spaces are the spaces for coolant to flow through that fuel element.

[Chart deleted.]

This is a cartoon of a nuclear weapon, which shows on the left the primary of that weapon; on the right is the secondary. [Deleted.]

[Chart deleted.]

CONTAINER MC2659B HELIUM-VENTED

This is a picture of one of those tritium storage bottles. They range in different sizes and shapes. They are called limited life components because we have to change them on a regular schedule.

Senator **Exon**. Excuse me, but do you mean you have to change the container? Is that what you mean?

Mr. **Wade**. We have to physically change that container; take a bottle out, which has decayed, and put a fresh one, a new one, in.

Senator **Exon**. What is the timeframe on that?

Mr. **Wade**. Let me answer that with the next slide, if I may.

[Chart deleted.]

[Deleted.]

What you must have is enough tritium in that bottle, in that limited life component, such that at the end of whatever the interval is [deleted] even given decay, there is still enough tritium in that bottle to make the weapon operate.

Now, that is a key thing which I will demonstrate on the next slide.

[Chart deleted.]

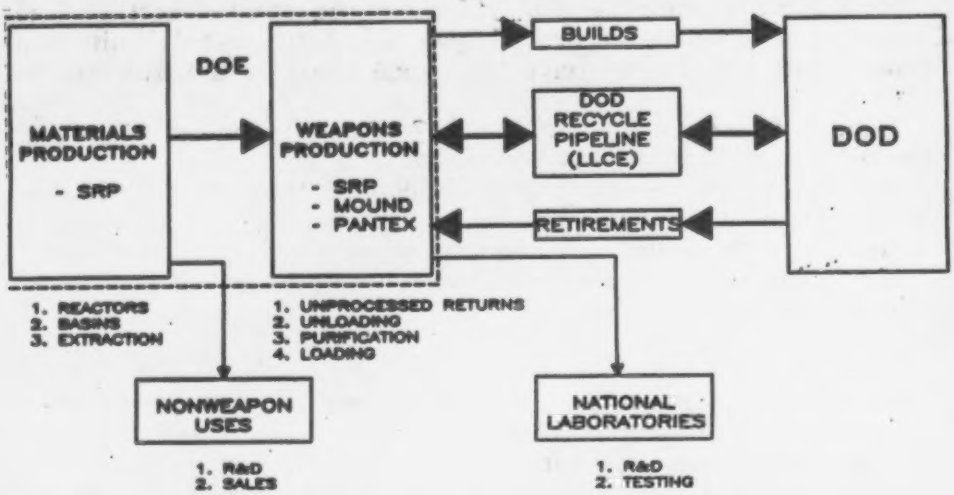
This is a curve that shows yield as a proportion of tritium fill. If you look up at the top there [indicating], the yield range is sort of the life of the tritium bottle. In the case of an SLBM, for example, [deleted], going from the right of that yield range bracket to the left, when you get to the left, you must still have [deleted] enough tritium in that bottle in order to assure that the primary will work in an adequate way to make the secondary of the weapon work.

Please note that on this notional diagram, the curve is [deleted].

Senator **Gorton**. Does that, in a sense, that chart, read from right to left?

Mr. **Wade**. Yes, it does, Senator. It reads from right to left.

TRITIUM SYSTEM OVERVIEW


DOE
MATERIALS PRODUCTION
- SRP
WEAPONS PRODUCTION
- SRP
- MOUND
- PANTEX
BUILDS
DOD RECYCLE PIPELINE (LLCE)
RETIREMENTS
DOD
1. REACTORS
2. BASINS
3. EXTRACTION
1. UNPROCESSED RETURNS
2. UNLOADING
3. PURIFICATION
4. LOADING
NONWEAPON USES
1. R&D
2. SALES
NATIONAL LABORATORIES
1. R&D
2. TESTING

This is a depiction of the tritium pipeline. It shows in an overview sense the tritium that is in the materials production part of DOE at the Savannah River plant. This is the inventory to which you referred, Senator Exon. That tritium is in reactors. It is in the basins. It is in the extraction canyons.

Moving from left to right, there is tritium, then, in the weapons production part of the plants at Savannah River, at Mound, and at Pantex, for the purposes of doing those four things.

Moving further to the right, the tritium then goes into the DOD pipeline, into limited life component exchange, the change of the bottles. And on the far right, of course, you have the inventory of tritium, which is in the weapons themselves, as they are deployed around the world.

Senator **Gorton**. What are the uses of tritium other than for these military purposes, where you have sales, down there at the bottom of the slide.

Mr. **Wade**. Let me just say, Senator Gorton, that there are DOD uses—I will have a chart on that later on. It's such things as runway lighting. I will get into that a little later on.

SR REACTOR STATUS

- REACTOR RESTART PROCESS HAS BEEN REEVALUATED
- RESTART FOCUS HAS SHIFTED FROM IMMEDIATE RESTART TO ONE OF ACHIEVING MAXIMUM ASSURANCE THAT REACTORS CAN BE OPERATED SAFELY OR UNTIL NEW PRODUCTION CAPACITY IS AVAILABLE
- NECESSARY FIXES WILL BE IN PLACE TO ASSURE INCREASED LEVEL OF SAFETY AND AN INCREASED ASSURANCE FOR AT LEAST A DECADE OF RELIABLE OPERATION

With regard to Savannah River reactor status, as I have testified earlier, the restart process is being evaluated. We have shifted the focus from immediate restart to one of assuring that what we do to the three reactors, including the one that we hope to start first, will allow those reactors to be operated safely and effectively over the next decade, until the new production capacity is available.

Let me assure this committee that the new Secretary of Energy, who is now the Secretary, as of yesterday afternoon, is very personally involved, very knowledgeable in this area, and is very personally involved in assuring that what we are doing meets his goals for safe restart.

REASONS FOR SCHEDULE UNCERTAINTY

- EARLY SCHEDULES BASED ON INCOMPLETE DEFINITION OF STARTUP REQUIREMENTS
- EARLY SCHEDULES BASED ON USE OF HISTORIC SEISMIC AND DESIGN BASELINES. PLANNING NOW ALLOWS FOR USE OF CONTEMPORARY SEISMIC AND ANALYSIS CRITERIA AND VERIFICATION OF DESIGN BASIS
- UNCERTAINTY IN EXTENT OF PLANT FIXES REQUIRED BY TECHNICAL ASSESSMENTS NOW UNDERWAY:
  - SEISMIC RESISTANCE
  - PLANT BASELINE
  - PRIMARY COOLANT SYSTEM INTEGRITY
  - POWER LEVELS

There are at least four uncertainties, as shown in the third bullet there: the seismic resistance of the plant; the plant baseline. The plants are 30 years old. There have been many modifications to the plants over that 30-year period.

In order to assure our oversight committees and our critics that we understand the performance of the plant, we need to assure first ourselves, and then them, that we have the plant baseline, and that the operation of the plant is well understood.

The third uncertainty is the primary coolant system integrity, to ensure that, given an accident or given even a safe shutdown of the reactor, in an earthquake, for example, that we can safely remove the decay heat and that there will not be any problem.

Finally, and very important to us and to this committee, is the issue of power level [deleted].

[Chart deleted.]

I have a couple of quick viewgraphs just to show some of the things that we have done to meet the new seismic standards.

Here is a fuel tank. You will note around the center the new seismic bracing, the concern being that in a design basis earthquake, of course, the probability that that earthquake will happen is fairly remote, but, nonetheless, this tank could have fallen off the wall in a design basis earthquake and damaged other equipment. So we braced it, as you see, about half-way up the tank.

[Chart deleted.]

Similarly, here is an air storage tank, where air is stored for instrumentation purposes, that has been braced, so that in an earthquake, it now cannot topple and damage adjacent equipment that is critical to removing the heat.

Senator EXON. Troy, let us see that one once again. What is that on the right side, the brown? Is that a steel post of some kind? Is that a support for the grey tank?

Mr. WADE. This is the support, Senator. It is a steel post, which is bolted by flange into the concrete at the bottom of that post, and then there are waist bands around that area receiver tank.

This tank is associated with the emergency diesel power which one has to have on stations. If you lose commercial power, the diesels then have to run to supply electrical power to the station. This is an air supply tank associated with that function.

Senator EXON. I think I see in that picture two steel posts bolted to the floor. Are there three or four of those?

Mr. WADE. There are three.

Senator EXON. Is one on the other side?

Mr. WADE. Yes, sir.

Senator EXON. Thank you.

[Chart deleted.]

Mr. WADE. This is the tritium supply situation as best we know it today.

There is a line there at [deleted] which we call the minimum.

Senator EXON. Is that where the line comes down, in the middle there?

Mr. WADE. This line, right here [indicating] is the one that I am referring to. This is the inventory; this is the Savannah River plant part of the inventory. This does not include what is in the weapons, in stockpile. This [indicating] is what is in the reactors and in the canyons at Savannah River.

Our best estimate of that minimum required to keep the system viable is [deleted].

This [indicating] is the desired quantity of tritium. So this is sort of the demand line [indicating]. [Deleted.] And so, you show tritium coming into the system.

Also reflected here are different requirements for tritium, for weapons builds, and for LLC bottle fills.

This is one way of depicting the demand.

This [indicating] is the supply line, as we now see it.

Here [indicating], we are sort of here right now. As I said the other day, for planning purposes we hope to restart one of the reactors late this calendar year. That is what is depicted right here.

We will not know for another month or so whether we are going to make the restart date. If we do not restart, this [indicating] is the slope of the curve, and that says that sometime [deleted]——

Senator Exon. In the [deleted]?

Mr. Wade. In the [deleted].

General Herres will show you this curve as it affects the weapon systems.

The red line is what happens if we are successful in restarting, but are held to a [deleted] power level, which, you will recall, is about the power level [deleted].

Senator Exon. That is the power level in [deleted].

Mr. Wade. Yes [deleted].

Senator Glenn. May I ask a question here?

Senator Exon. Go ahead, Senator Glenn.

Senator Glenn. What is your time lag between reactor restart and actual availability of tritium at the weapons? What is your process time?

Mr. Wade. Actual tritium at the weapons?

Senator Glenn. Well, available to be put in. In other words, to keep the stockpile going from reactor restart, there obviously will be some delay. I don't think it is a whole lot, but is it like a month, 6 months, or a year?

Mr. Wade. Well, it is several months.

Senator Exon. I take it what you are saying here is, that regardless of the time between the start of the reactors, this is the total supply that you have available, based on what the present plans are. For example, one thing would be the restart of the reactors, as you have indicated there.

Is this not the total supply, as opposed to when you restart the reactors and how long it takes to get the restart of the reactor tritium produced into a position and ready to go into a weapon? Is that correct?

Mr. Wade. That's correct. This is total supply [indicating]. But it is a long evolution. From the time you turn a reactor on until you, for instance, discharge the fuel from that reactor to recover the tritium, it is some number of months.

Senator Glenn. What I was getting at, Jim, is he shows the reactor restart there late this year.

[Deleted.]

Mr. Wade. [Deleted.] Senator Glenn.

Senator Glenn. It would be [deleted] from reactor restart until that tritium is actually available?

Mr. Wade. General Herres has that on a chart that we will see later.

General **Herres**. I can expand on that when I get to it.

Senator **Glenn**. All right. One other question.

Does this include the amount, there wouldn't be a whole heck of a lot of this, but would this include the amount that comes off the [deleted].

Mr. **Wade**. [Deleted.]

Senator **Glenn**. [Deleted.]

Mr. **Wade**. [Deleted.]

Dr. **Duncan**. Senator Glenn, General Herres will discuss in detail, all the specific weapon systems.

Senator **Glenn**. OK.

[Chart deleted.]

Mr. **Wade**. Within the DOE, we have taken some actions to improve the situation. We are looking at other actions. But, for example, these are one-time savings, if you will, of tritium.

We have reduced the logistics associated with [deleted] for a saving of [deleted]. We have expedited the [deleted]. And, we have reduced our own [deleted] leadtime.

[Chart deleted.]

Let me discuss for a minute alternatives: [deleted] and I will discuss a couple of other things as well.

[Chart deleted.]

N reactor, as you know, is on cold standby. It is currently being defueled. It was producing plutonium when it last operated.

N reactor could produce goal quantities of tritium [deleted] of tritium per year. It would take about 4 years to get to that quantity. It would require an up-front capital investment of $450 million. We have to go to a different core and to a high enrichment.

Once it was operating, it could operate for about 9 years. You will recall that we have had a continuing concern with the N reactor having to do with the growth of the graphite in the core. So it does have a finite life.

We are looking at that option. Within the Department, we will make yet another conscious decision on the future of N reactor when defueling is complete, sometime in April, which is consistent with our schedule for pinning down the restart of Savannah River.

The bottom line is this is clearly [deleted].

[Chart deleted.]

Dr. Duncan mentioned light water reactors as a contingency. This discusses just one of the three things that have been and are being considered with regard to light water reactors. One option is the completion of WNP–1 at the Hanford Reservation. That is an option that is being looked at as part of the alternatives in the new production reactor study. Again, it is not a near-term solution.

Senator **Exon**. Would that not be one of the last options that we would consider going to, restarting Hanford, given the problems that we know we have there?

Senator **Gorton**. These are two different ones. The N reactor is at Hanford, and the WNP reactor is a different one.

Senator **Exon**. Thank you.

Go ahead, John.

Senator **Glenn**. [Deleted.]

Mr. **Wade**. I think we have to consider that it is, Senator Glenn.

Senator Glenn. That gets into many other considerations [deleted].

I always thought in the back of my mind that if [deleted].

Mr. Wade. [Deleted.]

Senator Glenn. [Deleted.]

Mr. Wade. [Deleted.]

Senator Exon. If we could, now, let's try to get back on track. I certainly think that a member of the committee having questions particularly pertinent to the point that is being made is very much in order. These are really good suggestions, but I hope that we can get back on track and finish your presentations. Then all of these things I am sure will be asked of you by members of the committee.

Mr. Wade. Thank you, Senator.

Dr. Duncan. If I could make just one comment, Mr. Chairman. Troy Wade has just given the complete answer using that chart [indicating] with all of the graphs and lines on it, to your question of me. I gave a short answer but not complete answer. He has given you the complete answer.

Senator Exon. Yes. Well done.

[Chart deleted.]

Mr. Wade. [Deleted.]

So we do not see these as viable alternatives at the moment. We certainly have them on the list as options, though.

ACCELERATOR PRODUCTION OF TRITIUM

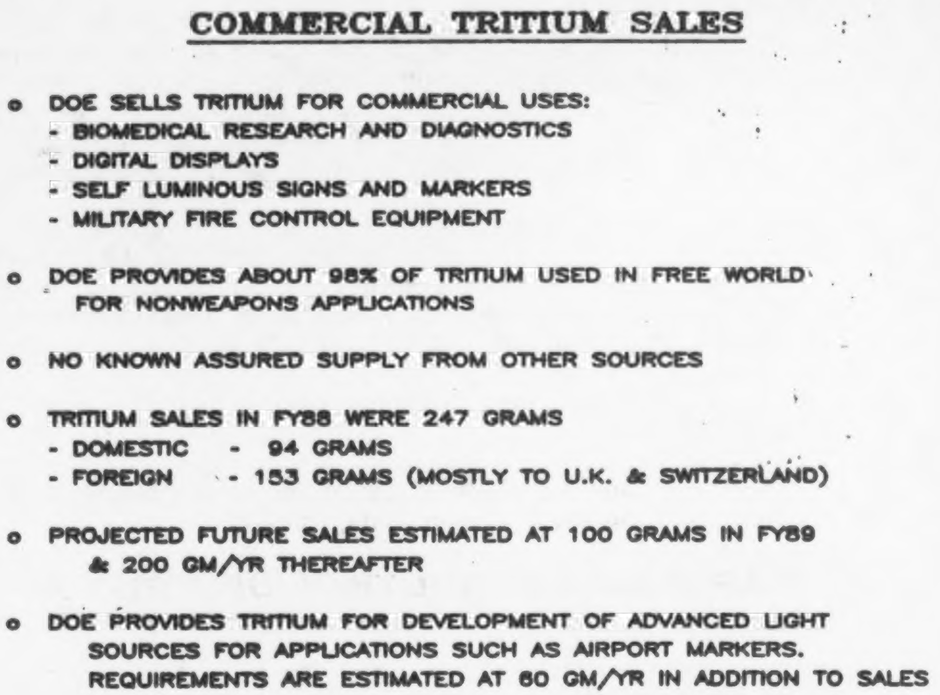
- TECHNOLOGY/APPLICATION UNDER STUDY FOR A NUMBER OF YEARS
- ERAB CONSIDERED TECHNOLOGY DEVELOPMENT PREMATURE FOR NPR CONSIDERATION
- MOTIVATIONS -- POTENTIAL LOWER COST, REDUCED SCHEDULE, AND LESS RADIOACTIVE WASTE
- UNCERTAINTIES
  - UNPROVEN BEAM TECHNOLOGY, NEUTRON TARGET TECHNOLOGY
  - UNCERTAIN SYSTEM PERFORMANCE, i.e. UNKNOWN TRITIUM PRODUCTION RATES
  - UNKNOWN COMPONENT LIFETIMES
- CONCERN -- NEEDS APPROXIMATELY 800 MWe POWER

Let me just very briefly discuss accelerator production of tritium. There has been a lot of publicity about whether or not an accelerator is a viable option. The Department of Energy has been looking at accelerator technology for a good number of years. It was considered as part of the Department's deliberations on new production reactor capacity.

[Deleted.]

We do not believe at this time that it is a mature technology, and we do not believe it is a viable option.

Now, one of the things that one reads all the time is that it is attractive because it doesn't produce any waste, and that is not quite true. You have to provide 800 megawatts of power to the accelerator to meet our tritium requirements, and whatever you use to provide that 800 megawatts is going to make waste, whether it is another nuclear plant or a commercial plant. So it is not a waste-free option.



COMMERCIAL TRITIUM SALES

- DOE SELLS TRITIUM FOR COMMERCIAL USES:
  - BIOMEDICAL RESEARCH AND DIAGNOSTICS
  - DIGITAL DISPLAYS
  - SELF LUMINOUS SIGNS AND MARKERS
  - MILITARY FIRE CONTROL EQUIPMENT
- DOE PROVIDES ABOUT 98% OF TRITIUM USED IN FREE WORLD FOR NONWEAPONS APPLICATIONS
- NO KNOWN ASSURED SUPPLY FROM OTHER SOURCES
- TRITIUM SALES IN FY88 WERE 247 GRAMS
  - DOMESTIC - 94 GRAMS
  - FOREIGN - 153 GRAMS (MOSTLY TO U.K. & SWITZERLAND)
- PROJECTED FUTURE SALES ESTIMATED AT 100 GRAMS IN FY89 & 200 GM/YR THEREAFTER
- DOE PROVIDES TRITIUM FOR DEVELOPMENT OF ADVANCED LIGHT SOURCES FOR APPLICATIONS SUCH AS AIRPORT MARKERS. REQUIREMENTS ARE ESTIMATED AT 60 GM/YR IN ADDITION TO SALES

Commercial tritium sales have come into the spotlight in the past several months as well. In fiscal year 1988, we provided 247 grams of tritium for nonweapon purposes.

Senator GORTON. I'm sorry, but I've forgotten the number of grams you were talking about. What percentage of tritium production does 247 grams represent?

Mr. WADE. What would it be? [Deleted] something like that.

Senator GORTON. A very tiny part of it?

Mr. WADE. A small amount.

It turns out that we're looking at 100 and 200 gram projections, Senator Gorton. Half of that, roughly half of that, is for the Department of Defense anyway. So you do have national security requirements for half of it. It's used for runway lighting, special operations, and there are also medical applications.

The Department, at the moment, has this under review again, pending our current relook at Savannah River. We did make a decision a few months ago that we would not stop commercial tritium sales, but it is clearly an option available to us. It is a very small amount.

SUMMARY

- CURRENT DEMAND CAN BE MET IF SRP REACTORS RESTART THIS YEAR AT THE REQUIRED POWER LEVEL
- THE DEPARTMENT WILL NOT RESTART ANY FACILITY UNTIL IT CAN BE OPERATED SAFELY
- IT WILL TAKE A DETERMINED EFFORT TO RESTART THE REACTORS THIS YEAR AND AT THE REQUIRED POWER LEVEL

You see here the summary with the tritium supply. [Deleted.] President Bush has said, Secretary Watkins has said, and I have said, that we will not restart any of the reactors until we are assured of their safety.

As I said, Admiral Watkins is personally involved. It's going to take a big effort.

Senator Exon, a question please, sir.

I am prepared to go ahead and discuss plutonium and uranium. It might well be better, though, if I stopped, at this point, with tritium, and let General Herres proceed.

Senator EXON. I think that probably would be the best way to go, because tritium and its effect on our nuclear deterrent is our key concern, although we want to know about those others.

So, why don't we go to General Herres.

Mr. WADE. Well, first to Dr. Duncan.

Dr. DUNCAN. I would like to make a comment, if I may Mr. Chairman.

Troy had talked about the supply side and General Herres will talk about the demand side. I want to mention that he is in a particularly key position to discuss this and to have a great impact on it.

General Herres is the Vice Chairman of the Joint Chiefs of Staff. He is the second ranking military officer in the country. He is the Chairman of the Joint Requirements Oversight Council, an instrument of the Joint Chiefs of Staff.

With respect to nuclear weapons needs and stockpile needs, the CINCs all report to him in that regard.

He is the Vice Chairman of the Defense Acquisition Board, which looks at all weapon systems acquisitions. The Under Secretary of Defense for Acquisition is the Chairman of that Board.

He represents the Chairman, Joint Chiefs of Staff, on the Defense Resources Board, which looks at the allocation of all resources, chaired by the Deputy Secretary of Defense.

General Herres is in a key position to control valves and throttles with respect to what our options are in this regard.

Senator **Exon**. Thank you, Doctor.

General Herres.

STATEMENT OF GEN. ROBERT T. HERRES, USAF, VICE CHAIRMAN, JOINT CHIEFS OF STAFF, AND MEMBER, NUCLEAR WEAPONS COUNCIL

General **Herres**. Thank you.

[Chart deleted.]

I also have some charts, Mr. Chairman, which I would like to walk through, which I think will answer most of your questions, or at least tell you what approaches and options we have available to us to address the questions that are yet unanswered, to cope with this problem.

Taking you back to a chart you have already looked at, you saw this tritium bottle. This is what this is all about.

What I am going to do is pick up from where Troy Wade left off. He started with the reactor end and worked across the problem. I am going to start at the weapon end, and work back to the problem. There will be an inevitable overlap.

This [indicating] is the tritium bottle from the [deleted]. I will show you what the spread looks like in a minute.

The name of the game is to replace these bottles because the tritium inside decays and becomes helium. When it gets past the point in the curve that Troy showed [deleted]. That's what it's all about.

Senator **Glenn**. Can they do that in the field, or do they have to take that back to Pantex or someplace?

General **Herres**. [Deleted.]

[Chart deleted.]

This chart, the vertical axis [deleted].

[Deleted.] But the typical consumer is out here, in the middle of this long spectrum [indicating], like the one I just showed you, which is around [deleted].

Now, that is the sort of picture with respect to the weapons on an individual basis.

Senator **Glenn**. May I interrupt you for just a second?

[Deleted.]

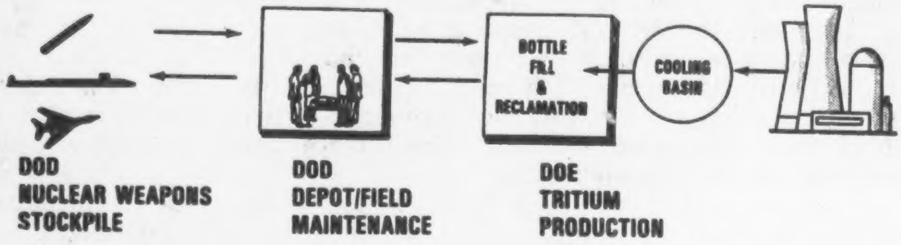
General **Herres**. [Deleted.]

Senator **Glenn**. [Deleted.]

General **Herres**. The precise percentage is [deleted].

Senator **Glenn**. Thank you.

TRITIUM BOTTLE EXCHANGE PROCESS



General HERRES. I might also add that [deleted].

This is the process that we have been talking about. As I mentioned, Troy started over here [indicating] and talked about the reactor and the production of the tritium. I am going to walk you from this end [indicating] back.

The weapons, as I indicated, are downloaded at [deleted]. The tritium is separated from the helium.

You noticed in Troy's chart there is still some tritium left in the bottle. But it becomes ineffective, and when that tritium is recovered, it goes back into the system, into the reservoirs there at Savannah River. And, of course, the new bottles are filled up from those reservoirs. They go back out in the field.

Now, there are pipelines here [indicating], two transit pipelines, literal pipelines, of course, that run from the reactor, across into the reclamation facility, into the storage tanks [indicating], and virtual pipelines, with bottles that are in transit back and forth [indicating].

There is a certain amount of residual tritium in that bottle being turned in. Of course, there is a larger amount in a bottle that is on its way back out to the field.

We will show this in a little while. But I think it is good to point out here that there are ways one, for example, can accelerate the rate of flow across these various portions of this process and reduce the requirement for overhead. Everything from the weapon on over to the right I regard, and will refer to, as overhead.

The overhead requirement is around [deleted]. I will show you that in a little while.

But there are ways you can squeeze that down a little bit. But there gets to be a limit, and that gets to your question, Senator Glenn. I will illustrate that in a few moments.

I just want to show the two types of pipelines, and in a later chart, you will see the amount of tritium that is in those two types of pipelines, as we go along.

[Chart deleted.]

This is the only chart that shows numbers of weapons. The rest of the charts are going to show quantities of tritium. But this is in numbers of weapons in the stockpile.

Let me give a little bit of background in history first.

The scale here runs up to [deleted] at the top. You will see the largest number of weapons that we had in our inventory was about [deleted]. Then the size of our stockpile began to drop off, and it has pretty well [deleted]. You will notice that we have a [deleted] curve here [indicating] on the numbers of weapons in the stockpile.

However, the tritium requirement is a little [deleted]. That is why I want to make sure you see this chart.

You will also notice that on the chart, we have shown a number of builds in each year and the number of retirements in each year. And, of course, since the stockpile [deleted] the number of builds versus retirements [deleted].

Now, this chart assumes [deleted] and it assumes the program, the 5-year defense program that we have on the books right now. We recognize, of course, with the strategic review and other issues that are underway [deleted].

Senator **Glenn**. [Deleted.]

General **Herres**. [Deleted.]

Senator **Exon**. General, is the military leadership generally satisfied with that [deleted] curve? As of now, are you comfortable with that?

General **Herres**. Yes, sir.

That line is our projected requirement. In other words, that is not constrained artificially.

Senator **Exon**. In any way?

General **Herres**. Well, now there is a certain amount of constraint, of course, with budgets and things like that.

But that is accurate.

It is consistent with what you are getting with the Chairman's military net assessment and his assessment of our posture and so on.

Mr. **Wade**. Senator Exon, if I may interject, it is precisely that data which is used as the requirements base for the modernization study, that [deleted] curve.

General **Herres**. As I will show you, we have sharpened up our requirements on an annual basis to facilitate DOE's efforts in that study, so that we could give them a constant projection.

In fact, if I may, I will put that chart back up and will draw on that point, but in just a moment.

You will note in the latter years that the builds and the retirements [deleted]. There are some variations in here. But one of the problems that DOE has, of course, is deciding how to size their plant. The independent variable in all of this is the weapon systems, not the warheads. There is a tendency to forget that sometimes, when you get lost in the grass here. But the independent variable is how many Peacekeepers there are going to be and how many Small ICBM or Trident D–5s and so forth. That, of course, is what drives the number of weapons, and when those weapon systems will be available to field. For example, the first D–5s go to sea this year with the *Tennessee*.

This drives the schedule.

And so, the trick that we have had over the years is how to flatten out these annual requirements so that DOE does not have to deal with peaks and valleys, which has been a very difficult thing for them to do.

What we have settled on is a figure of [deleted] warhead deliveries per year for planning purposes. That sustains this stockpile, if we can time our requirements uniformly. It's not an easy trick. I think you will get a feel for that as I go on through the briefing.

INVENTORIES OF TRITIUM INSIDE THE STOCKPILE

[Chart deleted.]

This chart has changed scales. I changed the vertical axis on you. This is grams of tritium [indicating], and these [indicating] are years. You see the inventory at the end of each year, where each of these points are [indicating] on the chart.

I am going to show more breakdowns in this chart. But I will start with a more generalized version of it right now.

You can see how the tritium is distributed within the stockpile itself. This [indicating] is just the stockpile. This does not include the overhead. I am going to show you a chart later on that will show you the overhead.

But everything on this chart [deleted] is all in tritium bottles somewhere, on some weapon, in some place. It is actually in the weapon itself.

This [indicating] is the strategic offensive force. You will notice that it [deleted]. I will show you the variables in a moment. But the demand for tritium by those weapons [deleted] mainly as the modernization program matures.

You will note that the tactical demand [deleted] especially when we get out here [indicating]. But basically it is [deleted].

Then you will see the fleet utilization, and that [deleted]. That involves modernization.

Now I am going to break down each of these three, one by one, into the individual weapons, starting first with the [deleted] and that is the strategic stockpile, the strategic offensive weapons.

TRITIUM IN THE STRATEGIC OFFENSIVE STOCKPILE

[Chart deleted.]

This [indicating] is the line that you saw on the previous chart, right here on top. It is a little more pronounced on this chart because we have changed the scale here. The scale only goes up to [deleted].

Now, this series of quilt charts is broken down so that a different color represents [deleted].

Most of them are labeled. [Deleted] weapons are not on this chart. They will be on the next chart. This is strictly the strategic, or what some refer to as the central systems.

You will note the phasing-in and the phasing-out. [Deleted.]

Here are the [deleted] [indicating], over here. So, at the end of the decade, we have the [deleted] [indicating], and the [deleted] [indicating]. And, of course, these are the two different types of warheads for the [deleted].

You will see the [deleted] the inventory, our modernized [deleted] safer, better weapons. It has [deleted] a big user. You will recall from a previous chart that it uses about [deleted]. And, of course, that is one of the reasons that this line [indicating] goes up. It's because the [deleted] user of tritium.

Down here, in the magenta color, you see the [deleted].

Since this is the same warhead that would be used on a [deleted].

I might add one more modernization example that you might want to take a look at here. [Deleted.]

Here [indicating] you can see the [deleted]. There is not a large increase there.

I think that is about as much as there is to show. You can see older [deleted] phasing out [indicating] as the new [deleted] come in.

This [indicating] basically becomes [deleted].

So, that is the strategic picture, and that is where the tritium is in that context.

One other point.

If there is a START agreement [deleted]. So if there is a START agreement along the lines that we have been discussing with the Soviets, 4,900 RV limit on ballistic missile warheads, and then the 6,000 total accountable weapons, and then the counting rule either as equipped or on the order of about 12 ALCMs per cruise missile carrier, then you will end up right about here [indicating] or so, a band right in this section. That would be about where we would end up.

In other words, we only [deleted].

So, unfortunately [deleted].

Senator **Gorton**. Excuse me, but would you put that in percentage terms? Is that a [deleted].

General **Herres**. That would be about [deleted] that is right, of the strategic, but not of the total. Remember, this is not the total, just of the strategic stockpile.

Senator **Gorton**. Yes.

General **Herres**. In fact, I will point that out again later, that is, where that falls.

TRITIUM IN THE TACTICAL STOCKPILE

[Chart deleted.]

This is tactical. It gets more complicated, of course, because there is a wider variety of weapons.

You can see, as I pointed out, the tritium requirement [deleted].

Remember the first chart I showed you [deleted].

Now, of course, one of the options that we have, although we have not settled on any particular choices yet, but one of the options we have is to use this up as we get to the point where we are having to start [deleted].

So, those are the kinds of things we have to look at.

Similarly, we can look at [deleted].

Here [indicating] is the [deleted].

Here [deleted]. We have some in the inventory now. There will be some expansion of that. It could be affected by [deleted]. I did not account for that when I discussed that earlier [deleted].

So, that is the tactical picture. Those are the requirements and that is how it all projects forward.

Next chart.

TRITIUM IN THE FLEET STOCKPILE

[Chart deleted.]

This is the fleet stockpile, a [deleted] portion of the requirement. [Deleted.]

INVENTORIES OF TRITIUM

[Chart deleted.]

Now, referring to a chart that I showed earlier.

This line you have seen before [indicating]. It was the top line of chart 28. It showed our total stockpile tritium inventory and that is this line [indicating]. Remember, it started at about [deleted]. We are back to a larger scale now, so these undulations are not quite as pronounced as they were when we looked at the individual pieces of this problem.

This line [indicating] you have not seen before. It accounts for the overhead that is required in the system, the pipelines, the literal and the virtual pipelines that I talk about.

As you can see, it is about [deleted] at this particular point, from about [deleted].

So that is what DOE has to shoot at as the total required inventory projection, because they have to worry about that pipeline as well.

Now I am going to build into this chart how things [deleted].

[Chart deleted.]

The first curve is the decay curve [indicating]. It goes from what we have now. DOE's inventory was actually [deleted] the required projection at the end of 1988. This red line is the decay line [indicating] for that whole inventory—what's in the stockpile plus the overhead that is required for support. It is not linear, although it looks linear on this chart. It starts out decreasing, at about [deleted] per year in that range. Then it gradually decreases at a slower rate because the inventory gets smaller, and the quantity that decays gets smaller. [Deleted.]

But think of it in terms of somewhere between [deleted] per year, as what is decaying, being used up in testing, and being sold commercially.

Now, what is actually decaying out there in the stockpile is a lower number, on the order of around [deleted]. This decay is actually in bottles.

But remember that what is in the pipeline is also decaying. What is in the [deleted].

The next chart will fill that in a little bit more.

[Chart deleted.]

This shows you where we are in the pipeline. By squeezing down [deleted] we can squeeze down the overhead requirement, which is, [deleted].

In other words, we have squeezed everything down [deleted].

These [indicating] are the pipelines for the tritium in transit. This [indicating] is the tritium there, and this [indicating] is the tritium that is in the pipelines, the literal pipelines, in the reactor, and at Savannah River. All of this tritium is in the overhead.

So, as we move on down, the top of the magenta section in that chart, we get down to where we are having to take [deleted].

There are a number of things we can do, and we are in the process of reviewing all that now. We have been tasked by the White House to look at [deleted] options.

One is what do we do if [deleted]. How do we cope with that, and how do we manage the stuff.

[Deleted.] So we would be looking at the option, as was implied in the earlier discussion, if we got Savannah River reactors up [deleted]. So we will be looking at what we do.

Senator **Glenn**. May I ask a question, Mr. Chairman.

Senator **Exon**. Sure.

Senator **Glenn**. [Deleted.]

General **Herres**. [Deleted.]

Senator **Glenn**. [Deleted.]

General **Herres**. Exactly.

Senator **Glenn**. [Deleted.]

General **Herres**. That's right. Exactly.

Now, just to give you a feel for the problem—and again, I'm not able to offer solutions right at this point because you can see that it gets fairly complicated—there are about [deleted] of tritium in bottles, in weapons, on day-to-day alert today.

So this gives you a feel for where you are—really, really, at the bottom line [deleted].

So, we stay above that over this [deleted] period of time [indicating]. If we generate all of our strategic nuclear forces, [deleted].

So, you can see we cut into that right out here, about [deleted] or so [indicating].

That is if we don't service anything else, in other words, if we leave those as [deleted] options. In other words, a fair amount of this, of course, is [deleted]. But if we leave just the strategic nuclear forces for [deleted].

That, of course, is the most dramatic way I can [deleted].

Senator **Exon**. General, this study that you mentioned a few moments ago, when do you expect that will be finished?

General **Herres**. It is due [deleted].

Senator **Exon**. [Deleted.]

General **Herres**. Now, there are a lot of variables that are hard to predict right now which should be settled [deleted].

There will be a few variables that will be settled by then, and we should have a pretty good handle on what our options are.

Now, what we really have to do is make a lot of tough choices, and we will be driving a lot of issues in for the Chairman of the JCS to review and prioritize these options.

So, that, as I say, is due [deleted].

Senator **Exon**. General, when would you be prepared to brief this committee on that [deleted].

General **Herres**. I would hate to commit now. You know, it is not inconceivable that we could get it in earlier. We do do that sometimes.

Senator **Exon**. Well, as soon as you can. It would certainly be shortly thereafter, right?

General **Herres**. Yes, sir. And I am sure you would want to see that as soon as you can.

So we will make sure that we make that available. [Deleted.] That was the answer to your question, Senator Glenn.

[Deleted.]

So, I guess the simplest way to remember this is if there is no tritium production whatsoever, we begin to [deleted].

Senator **Glenn**. If I read you right, you would not be back [deleted].

General **Herres**. Yes, sir. That's right.

Senator **Glenn**. Do the lines intersect out there?

General **Herres**. Well, it's even further out than that.

Senator **Glenn**. I was looking at your top line, your orange. Where that would intersect the blue, wouldn't that be it, over to the right?

General **Herres**. No, sir, because this one [indicating] has to be out to here, and this one has to get up to here [indicating].

Senator **Glenn**. So you're out, then [deleted] or so.

General **Herres**. [Deleted] yes, sir.

Now that is a nominal new production reactor production rate, and I don't recall what we built that chart for. It looks like about [deleted] we could probably get a little more out of that.

Senator **Exon**. General, as I understand your bottom line—I am trying to listen and put this all together—if we would get a START agreement [deleted].

General **Herres**. No, sir, not that high.

Senator **Exon**. Not even that high?

General **Herres**. No, sir.

Dr. **Duncan**. That was the strategic.

General **Herres**. It would be the difference of from here to here [indicating].

Senator **Exon**. So, in other words [deleted] agreement [deleted].

General **Herres**. That's right.

It will not be insignificant; no, I would not want to say it's insignificant. But it will not be a major saving.

Senator **Exon**. Then what is the percent?

General **Herres**. Think of it this way: it's about [deleted] requirement is [deleted].

Now, that would be spread out, of course. But it is the equivalent of shoving, or changing the slope of the curve [deleted].

And, of course, coming back out here [indicating], if you're looking at [deleted] the other end of that, that is not much. It does not help us very much at all.

[Chart deleted.]

The last chart I will just show you quickly to refer to the point I made earlier about the deliveries of nuclear weapons.

Senator **Exon**. Now that is an interesting, busy chart. [Laughter.]

General **Herres**. That chart shows you what the [deleted] problem was. Now we are [deleted]. Remember, I said it was a tough, tough, problem, to make this fit. You see, we've got to make all of these pieces of the quilt come out, so that they do not [deleted] in order to fulfill our promise to DOE that we would not need more than that, and this is our best shot at that right now.

Again, the independent variable is the weapons system, not the warhead itself.

So you can see how DOE is going to piece together production of various weapons, and the total requirement then will be about [deleted] per year.

[Deleted.] You know, a lot of budget issues will drive some of this because the budget systems will drive a weapon system, which in turn will drive the rest.

Senator **Glenn**. If there is a new authorization, can we put in something special to expand the graphic arts department? [Laughter.]

That is not the best graph that I ever saw.

General **Herres**. I just hope it shows you that this is a tough problem. I think that is illustrated.

That is all I have, and we are prepared now to respond to your questions.

Senator **Exon**. General, thank you very much.

I think we should go to general questions, Troy, we will go back to you for a few moments just to summarize the recommended plutonium and uranium position that you mentioned a while ago.

How long will that take?

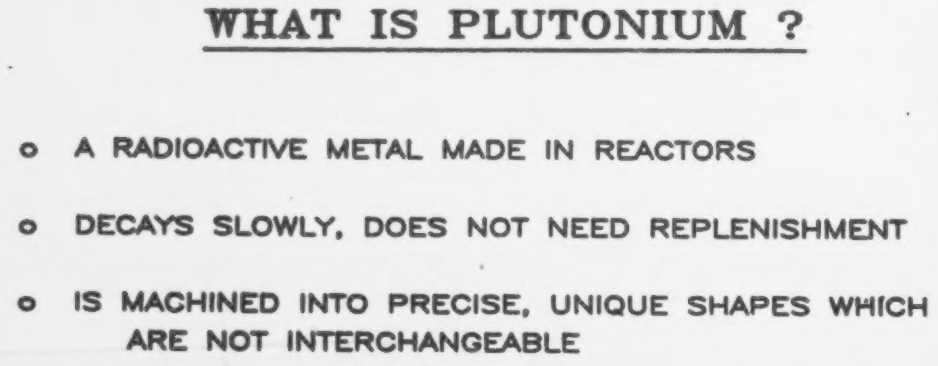
Mr. **Wade**. I can do that in about 5 minutes.

Senator **Exon**. Very well. Let's go ahead with that, so that we can have the whole picture.

NUCLEAR MATERIALS USE

[Chart deleted.]

Mr. **Wade**. Let me talk first about plutonium.

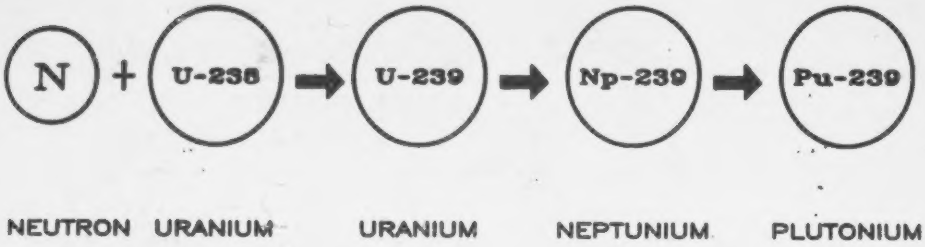


WHAT IS PLUTONIUM ?

- A RADIOACTIVE METAL MADE IN REACTORS
- DECAYS SLOWLY, DOES NOT NEED REPLENISHMENT
- IS MACHINED INTO PRECISE, UNIQUE SHAPES WHICH ARE NOT INTERCHANGEABLE

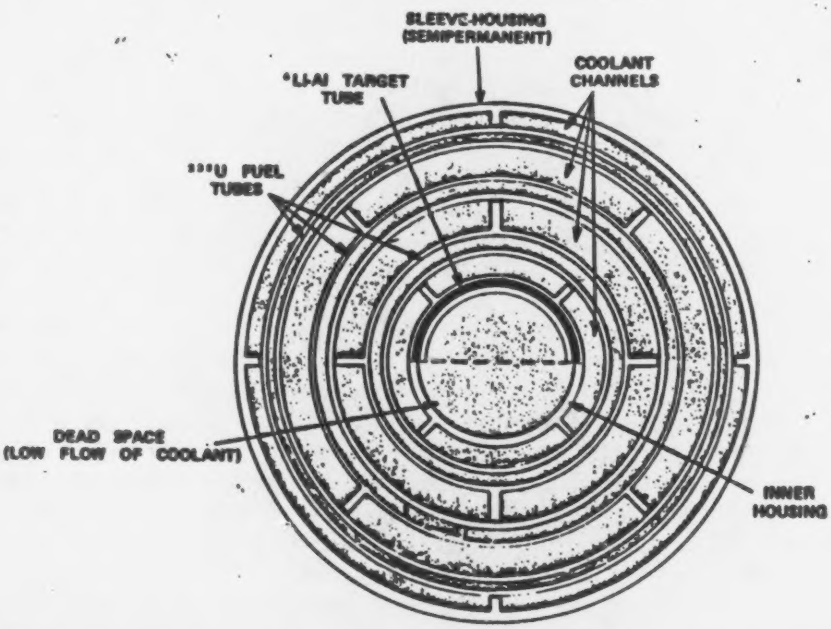
It is a radioactive metal made in reactors. It decays slowly, with a half-life of about 24,000 years. It is machined in our factories into precise, unique shapes, which are generally not interchangeable from one system to the other.

HOW PLUTONIUM IS PRODUCED IN REACTORS


N
+
U-238
U-239
Np-239
Pu-239
NEUTRON
URANIUM
URANIUM
NEPTUNIUM
PLUTONIUM

It is produced in a reactor by bombarding a target of depleted uranium with a neutron, producing Uranium 239, decaying to Neptunium, decaying to Plutonium 239.

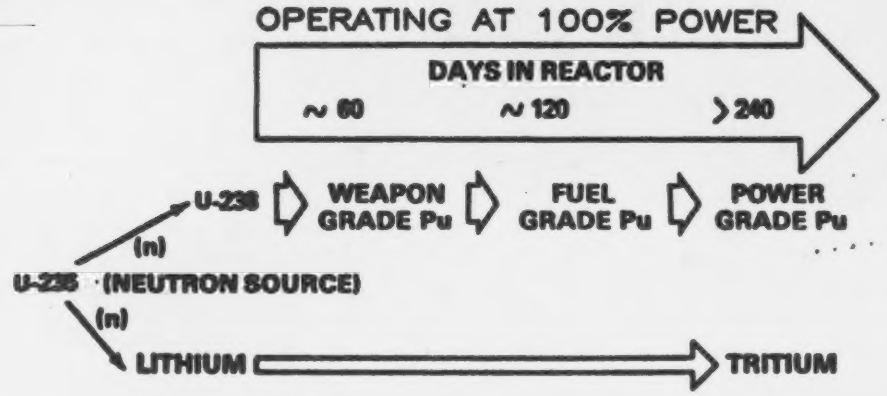
MARK 16B CROSS SECTION


SLEEVE-HOUSING (SEMIPERMANENT)
^{6}LI-AI TARGET TUBE
COOLANT CHANNELS
^{235}U FUEL TUBES
DEAD SPACE (LOW FLOW OF COOLANT)
INNER HOUSING

I showed you a cutaway of a tritium target. This is a cutaway of a plutonium target. You will note that they are the same general configuration, the same general geometry.

Here you have Uranium 235 as fuel, rather than so much lithium-aluminum for the tritium production.

HOW PLUTONIUM AND TRITIUM ARE PRODUCED IN THE REACTORS



Senator Glenn, this is a partial answer to one of your questions.

When you are attempting to produce plutonium, operating at 100 percent power, you have to stay in the reactor for 60 days to make weapons grade plutonium. It is not an absolute linear relationship. If you are running at 50 percent power, it's something slightly over 120 days. So the evolution is a long one.

[Chart deleted.]

This [indicating] is plutonium. This is a cumulative chart, which shows [deleted] of plutonium in the U.S. weapons system. It shows the demand line here [indicating], and this is the [deleted] here [indicating].

I will remind the committee that we are required in the President's stockpile memorandum to provide for the Nation's weapon program [deleted]. It is our hope that some day we will be able to.

But here, you see the new plutonium, the plutonium in the inventory. You see the contribution of blending over time which is now about constant due to the plan to switch all the Savannah River plant reactors to tritium production when they restart. At Richland, N reactor is being put in cold standby, and the continued reprocessing of existing material in the PUREX facility goes through about here [indicating] and then stays constant. Here [indicating] is where the Special Isotope Separation Facility comes online [deleted].

Senator GLENN. If I may ask a question, Troy, if you move that curve up, now, let's say you go to your 40 percent power on that one, and let's say you go to 70 percent power; do we also get a 30-percent increase, then, just by that percent of power increase? Would we increase tritium and plutonium production by 30 percent?

Is the percent of the stuff you have coming out directly linear with the percent of power you are operating at? I guess that is my question.

Mr. **Wade**. It is not directly linear, Senator Glenn. Running a Savannah River reactor at 100 percent power is [deleted]. The thing I think you need to remember is that we don't see any scenario wherein we would be able to run Savannah River reactors on plutonium. We are going to need them in the tritium area through this decade.

Senator **Glenn**. You can't run plutonium and tritium, at the same time?

Mr. **Wade**. Not in any quantities, no, sir.

Senator **Glenn**. On your tritium production, now, let's say you run at 100 percent power and you have a certain output for that period. If you run at 50 percent power, do you get 50 percent as much tritium?

Mr. **Wade**. Yes, sir.

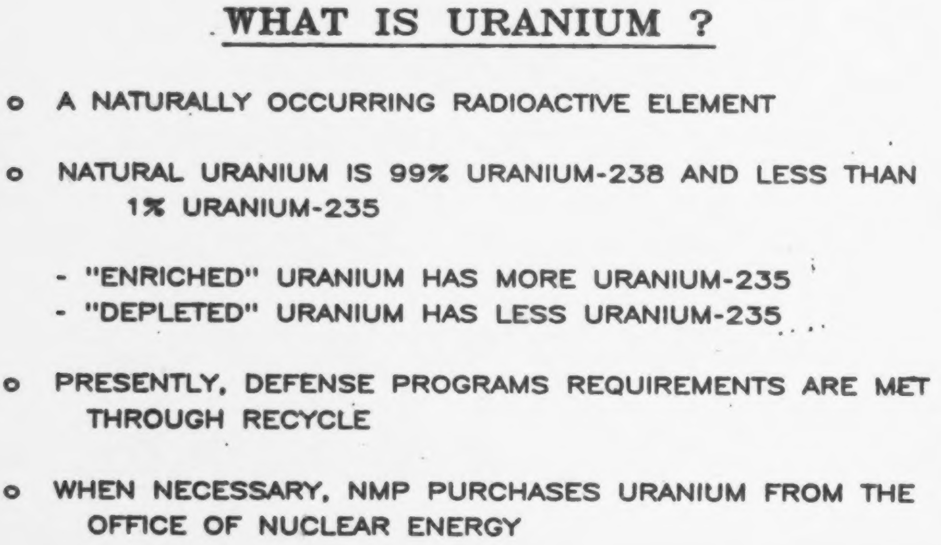
That is roughly the case.

Senator **Glenn**. OK. Thank you.

[Chart deleted.]

Mr. **Wade**. I want to say just a word about special isotope separation.

It will be our only supply of heavy metal, of plutonium, in the decade of the 1990s. [Deleted.] So it is a significant amount of plutonium, which now we consider almost as scrap.

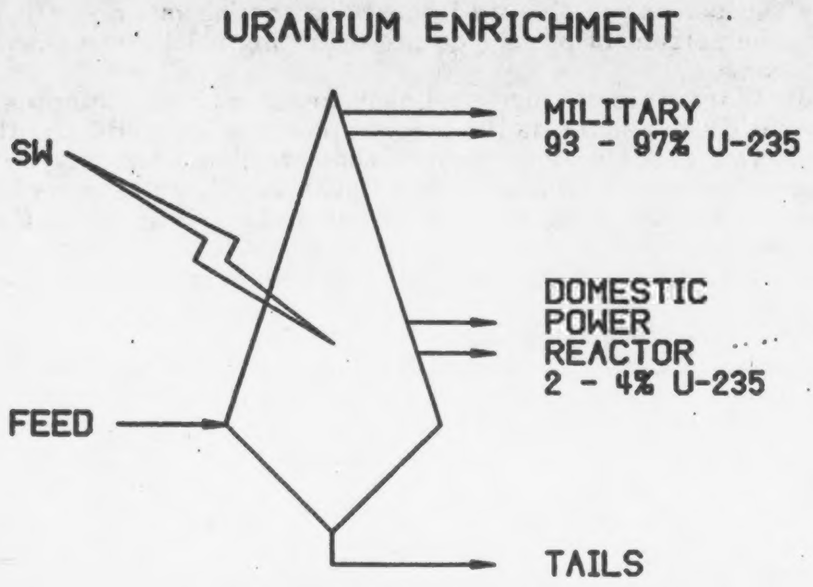


WHAT IS URANIUM ?

- A NATURALLY OCCURRING RADIOACTIVE ELEMENT
- NATURAL URANIUM IS 99% URANIUM-238 AND LESS THAN 1% URANIUM-235
  - "ENRICHED" URANIUM HAS MORE URANIUM-235
  - "DEPLETED" URANIUM HAS LESS URANIUM-235
- PRESENTLY, DEFENSE PROGRAMS REQUIREMENTS ARE MET THROUGH RECYCLE
- WHEN NECESSARY, NMP PURCHASES URANIUM FROM THE OFFICE OF NUCLEAR ENERGY

Let me move very quickly into the final material that I want to talk about today, uranium. It is a naturally occurring radioactive element. It is used in the warheads as part of the fission-fusion process. [Deleted.] Presently, the defense programs and the weapons requirements are met through recycle, that is, the recovery of uranium from retired weapons.

We have not made new uranium, provided new uranium, for the U.S. weapons inventory for 26 years.


URANIUM ENRICHMENT
SW
FEED
MILITARY
93 - 97% U-235
DOMESTIC
POWER
REACTOR
2 - 4% U-235
TAILS

You get feed from the uranium enrichment plants, and there you see depicted the enrichments for military uses. We're running at 93 to 97 percent U–235, and you see there the domestic power reactors just as a measure, are at 2 to 4 percent enriched.

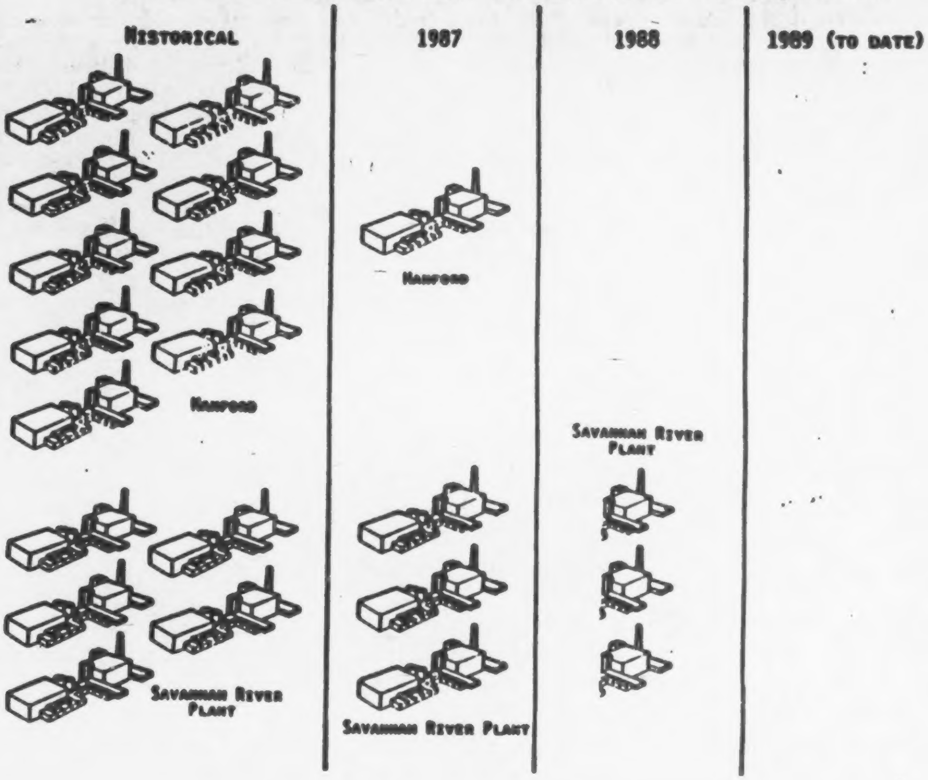
[Chart deleted.]

This is the highly enriched uranium supply demand curve.

This [indicating] is the strategic stockpile of the United States, metric tons of uranium. As I said, the last new purchase was—was it 26 years? Yes.

This is the demand [indicating], and the supply [indicating]. [Deleted] and so, it is the Department's intent to begin to fund for and purchase highly enriched uranium, probably as part of the 1992 budget request.

PLUTONIUM/TRITIUM PRODUCTION CAPABILITY



I want to close by showing you two quick viewgraphs.

This [indicating] is the U.S. plutonium-tritium production capability. It was 14 reactors historically, down to 4 in 1987, down to 3 at half power in 1988. There are none at this date.

[Chart deleted.]

Finally, I want to show you a comparison. This is the operating history of U.S. production reactors [deleted].

But, nonetheless, the comparison is quite striking.

Thank you, Mr. Chairman.

Senator EXON. Thank you.

One last question on specifics. In answer to my question in regard to a START agreement [deleted]. Would that go a long way to solving our plutonium and uranium long-term problem?

Mr. WADE. Let me accurately answer that for the record, Mr. Chairman.

[Deleted.]

Senator EXON. Do you have an idea what the difference between them will be?

[Pause.]

Mr. WADE. It is so dependent on discreet weapons. If you take the chart that General Herres showed——

Senator EXON. Why don't you just supply that for the record, if you would, please.

Mr. WADE. All right.

[The information follows:]

The United States and the Soviet Union have agreed that a START agreement would limit the number of strategic nuclear delivery systems (heavy bombers, deployed ICBMs, and deployed SLBMs) to 1,600. The total number of accountable nuclear warheads allowed on those vehicles would be 6,000. Within those bounds, the number of ballistic missile (ICBM and SLBM) warheads would be limited to 4,900. In addition, the U.S. has proposed an additional sublimit of 3,300 for ICBM warheads. There would also be a limit of 154 heavy ICBMs with no more than 1,540 warheads on them. The aggregate ballistic missile throw-weight allowed would be limited to a level approximately 50 percent below the current Soviet level.

However, the U.S. and the Soviet Union still differ on a number of important issues such as mobile ICBMs, heavy ICBMs, air-launched cruise missile accountability, and sea-launched cruise missiles. These issues and others will have to be resolved before a treaty can be completed.

Obviously, any material from retired weapons would help the availability situation. Whether that material would be sufficient to solve the long-term problem will be dependent on the specific warheads to be retired. Scenarios could be presented that would solve the material problem, and scenarios could be presented that showed a continuing problem. Any scenario calculated at this time would be based on conjecture and not on the reality of a situation that would require close cooperation between the Department of State and the Department of Defense to address treaty requirements and national security needs.

Senator EXON. I have one last question in that regard.

With regard to enriched uranium [deleted] if we scrapped those old [deleted], would that significantly help us?

Mr. WADE. Yes [deleted].

Senator EXON. Thank you gentlemen, very much.

Let's go to a round of questions. We will have a 6-minute round.

First, gentlemen, just a general question that is on my mind. I think, and I hope, that the answer would be no problem. You are familiar, I think, with the Exon-Florio amendment last year, which was designed to address the arresting of foreign takeovers of industries that are critical to our national defense.

Recognizing that these are facilities run by the Government, we don't have to worry about our Government being taken over, except by peaceful means. In the material production chart that you had up there, is there anything in materials production or supply or the flow of these critical raw materials where we are dependent on any company for supplying either equipment or raw uranium, for example? Or is that all under direct government control?

Another way of putting it is there anything we have to worry about anywhere in this pipeline, from beginning to end, where foreign takeovers would give us less control of these facilities than we might like to have?

Mr. WADE. I can't give you a 100-percent assurance because I am not quite sure of the very beginning of the fuel cycle; namely, uranium ore, and the enrichment facilities and so on. There is a current separate controversy about that.

With regard to the complex for which I am responsible, we have particular regulations to assure that there is no foreign participation or foreign ownership, and there have been instances in the past where companies that have been doing business with us, not major operating contractors, have been acquired by foreign companies. We have either changed those contractors or built in a satisfactory division until the contract expired.

So I believe we are protected, Senator Exon.

Senator **Exon**. Please give us a further statement for the record on that.

[The information follows:]

In the last 4 to 5 years, there has been only one contractor that has been subject to foreign ownership. Regulations exist that notify the Department of Energy Office of Defense Programs when a company performing contract work is being purchased by any foreign country.

Senator **Exon**. Do you have anything to say on that Dr. Duncan?

Dr. **Duncan**. No. I have nothing to add.

Senator **Exon**. Troy, let me ask one other question.

In reading the newspapers about the tritium that is awash down there in the cooling system, as I understand it, at Savannah River, and how plans were not made early to reclaim that, is that nitpicking, or is there any chance that we could reclaim any of that tritium that I referred to, economically?

Mr. **Wade**. There is about 2 kilograms of tritium that is in the heavy water, in the coolant heavy water at Savannah River. If we were to start today and invest $90 million—those were in 1987 dollars—in 5 years, we could recover about 75 percent of that.

So, you can recover a kilogram and a half of tritium after 5 years for about a $90 million investment. We do not consider that either a prudent investment or a viable alternative, Senator.

Senator **Exon**. Thank you, Troy.

General Herres, have the Joint Chiefs of Staff considered [deleted].

General **Herres**. We have not considered that. The staff has that as one of the options that is being looked at among the many others that I referred to that we'll have to consider as we decide how to manage the drawdown.

That certainly would be one.

As those options are developed, then, they will be presented by the staff to the Chiefs themselves for review and the selection of options.

[Deleted.] That would probably—and I am just giving you this as a personal view right now; I'm not sure how all the Chiefs would come down collectively or how the Chairman would come down—that is clearly one of the areas we will have to look at first.

Senator **Exon**. Mr. Wade [deleted].

Mr. **Wade**. We do have a program to do research and development [deleted] Mr. Chairman.

Senator **Exon**. Thank you.

My time is up on the first round.

Senator Gorton.

Senator **Gorton**. Could you put the very large chart you showed back up again [deleted].

[Chart deleted.]

As I understand it, that chart indicates the number of [deleted]. Is it valid in showing us the safety or the projects between now and the year 2000 and the ability to produce tritium? [Deleted.]

Mr. **Wade**. I think there are two problems, Senator Gorton. None that we are aware of. [Deleted.] It's a very difficult question to answer.

Senator **Gorton**. As far as you know [deleted] which will continue in this period of time that we are addressing?

Mr. **Wade**. [Deleted.]

Senator **Gorton**. Do you regard as being of any practicality the current proposal of some of the peace groups that we join with the Soviet Union and give up the production of tritium?

Mr. **Wade**. No, sir. I clearly do not.

Speaking now as Troy Wade—this is Troy Wade's opinion and is clearly not an administration position—there are far too many uncertainties for that to be a reliable measure of disarmament [deleted].

Senator **Gorton**. Would you get this chart back up please [indicating].

I am afraid I may not have understood the total meaning of that chart.

[Chart deleted.]

I refer particularly to the red line that says [deleted]. Tell me again, what does that mean. Does that mean a [deleted].

Mr. **Wade**. This is a phased restart, with one reactor starting, in the latter part of [deleted] the October-November timeframe; the other two starting on 90-day intervals thereafter.

The red line is [deleted].

The black line is [deleted].

The purpose of showing these two curves is to show [deleted].

Senator **Gorton**. And also, even to be on that red line, you have to [deleted].

Mr. **Wade**. That is correct, sir.

Senator **Gorton**. That is the only question that I had on that slide.

Mr. Wade, how confident are you, if you can express it in a percentage of confidence, that we could have a new heavy water reactor operating and producing tritium at Savannah River in 10 years?

Mr. **Wade**. I think that that is an achievable success-oriented schedule, Senator Gorton.

I think, if I had to quantify it, I would say that I'm probably 75 percent confident that we could have it in 10 years.

Senator **Gorton**. Now, is that a confidence which includes, which concentrates on your engineering, you know, our technological capability of doing it, or does that roughly 70 percent figure include the meeting of all environmental law suits and challenges, which have nothing to do with their technological capacity?

Mr. **Wade**. My 70 percent would cover all of those. I think heavy water technology is understood. However, the new reactor at Savannah River would look quite different from the existing heavy water reactor. So there are a great number of engineering changes that need to be incorporated into the new design, most of which I think we understand.

There are great uncertainties about the timeframes in which one can deal with the environmental issues, the NEPA issues, and the safety certification issues.

Senator **Gorton**. Mr. Chairman, My time is up. I have to leave in 4 minutes.

May I ask one more question, with your indulgence?

Senator **Glenn**. Sure, it's all right with me if it's all right with the chairman.

Senator **Exon**. Go ahead. The Chairman has some problems, too, but you go ahead.

Senator **Gorton**. Thank you.

I have just one more question.

[Deleted.]

Mr. **Wade**. [Deleted.]

Senator **Gorton**. Thank you, Mr. Chairman.

Senator **Exon**. Senator Glenn.

Senator **Glenn**. Thank you, Mr. Chairman.

There is a rumor going around in the nuclear community that says a shipment of tritium on its way to the United States from Chappel Cross reactor in Great Britain, that it's on its way, with 7 kilograms, four pressurized casks. Is that all hogwash?

Mr. **Wade**. Yes, sir, Senator.

Senator **Glenn**. Pure hogwash?

Mr. **Wade**. That is a shipment of research reactor fuel from Japan, which stopped briefly in the United Kingdom, and it's currently on its way to the United States per long-existing agreements. It is not tritium.

Senator **Glenn**. OK.

Do we have anything coming through that route, plutonium or anything else?

Mr. **Wade**. No, sir.

Senator **Glenn**. Nothing that is of any importance to our weapons program?

Mr. **Wade**. None.

Senator **Glenn**. When we bring weapons in, and let's say we are going to use them as a Pu source, as a plutonium source, as we go to different weapon systems [deleted] what percentage is lost, as we take that plutonium out and remanufacture it into new weapons and new designs [deleted].

Do you have any figure that you can give on how much we lose in that transfer? We have always looked at this as [deleted] and so, the plutonium use was not quite as critical as maybe the tritium is.

I am just sitting here wondering whether we need to also provide in the future for plutonium production as well as tritium if we lose a substantial amount in this transfer to new weapon systems.

Is there a factor on that that you can give us?

In other words I have great faith in arms control—ha-ha-ha—at this point, and so, that may be our source into the future. We won't need new plutonium production. But if arms control does not take hold and Gorbachev takes a different tack one of these days and we are back into real production requirements, it's a different picture than if we feel we really can get a high percentage of the old plutonium over into new weapons, or whatever the design might be.

Mr. **Wade**. We can recover a substantial amount of it. There is not a large loss. Let us supply you with an absolutely correct answer, Senator.

Senator **Glenn**. Fine.

[The information follows:]

Plutonium from retired nuclear warheads and bombs is recovered for use in new weapon designs and modifications. Through the utilization of several chemical purification processes, about [deleted] of the plutonium is recovered for use in new production. All of this material is not recovered and made available immediately, however. Due to the current limitations on plutonium recovery capacity and capability, lean (low-plutonium-content) residues generated from processing are stored for future recovery when processing capacity/capability becomes available.

Senator **Glenn**. Then that gets into whether you need two reactors or one reactor, and the request for two reactors. While I would like to go that route, I am not sure money-wise that we are going to.

I think we absolutely have to have one. I don't think there is any doubt about that. But if you really saw a requirement for plutonium in the future, then two reactors gets more credibility than it otherwise would have.

Do you know what I'm driving at?

Mr. **Wade**. You will recall, sir, that we have said that what we are striving to provide is capacity, capacity in the next century, that could produce either tritium, which would guarantee an assured supply of tritium, which also could produce plutonium, if required.

Senator **Glenn**. Yes. I said it was referred to a little while ago here.

Do we have a list of all of these studies that are going on about tritium, and who is doing what, who is looking at them? Are there a number of studies?

General **Herres**. I don't think there is a great number, Senator. [Deleted.]

Senator **Glenn**. Maybe my question should be this. Could you give us a list of all the studies that bear on this issue so that we have a complete list, for tritium?

Dr. **Duncan**. I think most of them would be within the Department of Energy somewhere.

Senator **Glenn**. Yes, I presume they would be. I just don't know what all of them are.

Mr. **Wade**. Some things we are doing internally, sir.

We will put together a list and get that to you, sir.

Senator **Glenn**. Good. We appreciate that.

You can supply that for the record.

[The information follows:]

There are two formal studies underway which bear on the tritium situation, and the Department of Energy (DOE) is involved in both. [Deleted.] DOE is evaluating options for alternative tritium sources. [Deleted.]

Senator **Glenn**. In your opening statement, Mr. Duncan, you had a statement at the bottom of page 3 which sort of jumps out at you a bit: "In the Council's opinion, the stockpile plan [deleted]. That sort of popped out at me.

Dr. **Duncan**. I think General Herres would probably be the best one to comment on that.

Senator **Glenn**. [Deleted] short right now of anything they need out there?

General **Herres**. Well, no, sir. I think we really have to talk about weapon systems rather than warheads. [Deleted.]

I cannot give you any [deleted] requirement off the top of my head here.

Senator **Glenn**. Would you supply that as part of the record? I just noticed that in Mr. Duncan's statement, at the bottom of page 3, in the last paragraph—[deleted] you had in there.

That sort of sends up a yellow flag to me.

General **Herres**. My staff just reminded me that there could be [deleted]. I think that is what the statement refers to.

Senator **Glenn**. If you would supply an answer for the record, we would appreciate it.

Dr. **Duncan**. I will supply that.

[The information follows:]

[Deleted.]

General **Herres**. Both those weapon systems were on the chart that I showed you.

Senator **Glenn**. Now let me show my ignorance in some of these areas on nuclear matters.

Is there any other material or gas that we can use, besides tritium, as a neutron source for what tritium does? Has that been looked at?

Mr. **Wade**. [Deleted.]

Senator **Glenn**. [Deleted.]

General **Kavanaugh**. [Deleted.]

Senator **Glenn**. So, tritium is it. We either go with tritium or we unilaterally disarm.

My time is up, though I have some more questions, Mr. Chairman, for the next round.

Senator **Exon**. Thank you, Senator Glenn.

Mr. Wade, back to a question that I asked you earlier. I did not do a followup at that time, but I will do one now.

When you are projecting what we are going to do in the future, I assume that you are basing those projections on not violating our policy of not relying on civilian sources for tritium.

Is that correct?

Mr. **Wade**. None of the assumptions that we have made rely on civilian sources at this point. Yes, sir.

Senator **Exon**. Let me ask this.

This 10-year proposition to build a heavy water reactor seems to continue to bother me. Some proponents say that we are not moving fast enough on this and that by combining design techniques, we could move much faster than that.

Answer that question, if you will, why it takes 10 years. Second, how long did it take, from the time they started, to complete the first reactor at Savannah River? Was it about 10 years, 5 years, or 3 years?

Mr. **Wade**. Let me answer that in two parts, Mr. Chairman.

My memory is that they built the first Savannah River reactor in about 3 years, and that it took about 4 years to build all five reactors.

Senator **Exon**. Why does it take 10 years to build them now when we know what we are doing, supposedly?

Mr. **Wade**. May I ask Mr. Cochran, who is in charge of that, to answer that question.

Senator **Exon**. Please, Mr. Cochran.

Mr. **Cochran**. Yes, sir.

We have looked pretty carefully at the schedule for the 10-year period, and the schedule calls for design of about 2½ years, a construction period of about 5 years, which is about the very best that the industry has been able to achieve for a modern reactor, and about 6 months to 1 year for startup.

If you stack all those up, that is the time, the 10-year timeframe, that we are talking about.

Now, the proponents of these reactors tell us they might be able, if everything went perfectly, to squeeze out maybe 1 year from the 10. But that is the best they say they can do, if they are not constrained.

Senator EXON. Then answer my question, if you will.

Why could we do it in 3 years back at the time we were in the beginning process and it takes us 10 years to do it now? I don't understand that.

Mr. COCHRAN. There were much simpler plant designs in those days, sir. The designs at Savannah River were basically a tank of stainless steel holding the core.

Today, you have to build a much different plant design. It will look very much like a modern light water reactor plant, even for the heavy water technology.

The consensus is that the plant design that was built in 3 or 4 years at that time would not be acceptable today for either NEPA or a safety standpoint.

Now, those have been upgraded many times over the years, so you cannot just take the 3 or 4 year construction schedule by itself. We spent a lot of time and money upgrading those plants in the 30 years they have been operating.

Senator EXON. Well, given that, and the significant costs that we are going to be faced with, and the serious conditions that you have outlined very effectively for us here this morning, what is the attitude of the members of the panel here this morning on the wisdom of trying to pursue a dual reactor strategy which the Department of Energy is currently supporting? Is that wise, given the cost?

Dr. DUNCAN. Let me comment on that. We have discussed that many times, Mr. Chairman.

The Department of Defense, in describing its needs to the Department of Energy, said that our needs were an assured supply of tritium, and we laid out the quantities that were required in terms of supporting the weapons stockpile.

The Department of Energy study recommended, as a result of that requirement for an assured supply, that there be dual supplies, that these use different technologies, that they be located in different places because of seismic reasons and other reasons, and we have accepted that as an answer to our assured need, our need for an assured supply of tritium.

Senator EXON. Is the Department of Defense, in your opinion, prepared to pay for a second reactor in order to have the additional protection we need? I don't think that has ever been addressed.

Maybe it is being bounced back and forth between the Department of Defense and Energy. Who is going to pay for that?

Dr. DUNCAN. We don't have it in our budget. We don't have it in our 5-year plan.

Since post-World War II, with the establishment of the Atomic Energy Commission and with the separation of nuclear materials production and the weapons systems between the two Departments, the Department of Defense has not been required and has not budgeted for the production of critical materials.

Senator **Exon**. General Herres, if we get into a [deleted].

Is that possible?

General **Herres**. Yes, sir.

Senator **Exon**. [Deleted.]

General **Herres**. That's right. Exactly.

Senator **Exon**. My last question, which I will ask for the record, will be to you, Mr. Wade.

Has the Department taken any steps to develop nuclear weapons that are less dependent on tritium? I guess that was pretty well asked before, but I think the answer to the question, from what I heard you say, is that [deleted].

Is that correct?

Mr. **Wade**. We continue to look at that, Mr. Chairman, [deleted]. It is a complicated question to answer. [Deleted.] So, there is a balance.

Senator **Exon**. The DOD is looking at that possibility, [deleted].

General **Herres**. No, sir.

[Deleted.]

Senator **Exon**. Gentlemen, I will turn this over to Senator Glenn in just a moment.

There may be some additional questions for the record, and I would ask you to respond as quickly as you can to those.

I want to thank you for being a tremendously interesting and informative panel this morning. You have been very helpful.

I would just like to say, before leaving, that I want all staff to particularly understand that this was an especially sensitive discussion that we have had here this morning, and I would hope that no notes, comments, or other material would be removed from the room, and certainly nothing about this briefing this morning should be repeated outside of this room.

Thank you very much for being here.

Senator Glenn, would you please proceed with your questioning.

Senator **Glenn**. I will, indeed.

But before you leave, I want to associate myself with your remarks on the nature of this morning's hearing. I think this has been excellent, very good, very helpful. It has answered a lot of questions here.

We still have a lot of questions yet to go before we are out of the woods on this. But I think this has been an excellent briefing, and I want to congratulate you all and say the same thing that the chairman did. I want to associate myself with the chairman's remarks.

I have just a couple of other questions, Mr. Chairman, and I know you have to leave.

If all else turns to worms—[deleted] do we have actual plans [deleted].

Number one [deleted] and do we actually have anything going on that will provide that supply [deleted.]

Mr. **Wade**. [Deleted.] I think the answer to your question is [deleted] that would be a partial, but a very small, contribution to the answer.

It is clearly [deleted].

Senator **Glenn** [presiding]. [Deleted.]

Mr. **Wade**. That is correct. They do not.

Senator **Glenn**. Could they be geared up to do that [deleted].

Mr. **Wade**. No, sir.

It is my understanding that [deleted].

Senator **Glenn**. [Deleted.]

Mr. **Wade**. [Deleted.]

Senator **Glenn**. [Deleted.]

Mr. **Wade**. Yes, with one weapon in each.

Senator **Glenn**. We may be back to that point again, though maybe not quite. [Laughter.]

General **Herres**. [Deleted] with one warhead. [Laughter.]

Senator **Glenn**. [Deleted.]

Anybody?

Mr. **Wade**. [Deleted.]

We don't have a good feeling at all [deleted] Senator Glenn.

Senator **Glenn**. [Deleted.]

Mr. **Wade**. For manufacturing tritium?

Senator **Glenn**. [Deleted.]

Mr. **Wade**. Oh, No. [Deleted.]

General **Herres**. Senator, we even have a debate going [deleted].

We have not settled on that. It makes a big difference in some of our estimates as a matter of fact.

So, with that much uncertainty about something so basic, you can judge how much there is about [deleted].

Senator **Glenn**. [Deleted.]

General **Herres**. My guess is they [deleted].

Senator **Glenn**. We estimate [deleted].

General **Herres**. I have forgotten what the number is, [deleted].

Senator **Glenn**. Mention was made a while ago when we talked a little bit about the tritium requirements [deleted].

Is that correct?

Dr. **Duncan**. [Nods affirmatively.]

General **Herres**. I probably should have been quick enough to add at this time that START would make a difference of about [deleted] warheads, give or take, depending upon a number of variables. But we are talking, roughly [deleted] warheads, different from what you saw projected on the charts here. And so, you can say that there is a [deleted].

Senator **Glenn**. The way the proposal is in START right now, does it take [deleted]. It's just the delivery systems, the pickup truck, et cetera?

General **Herres**. That's right, and, of course, the treaty is [deleted].

Senator **Glenn**. Which is rather strange arms control. In a time of some great crisis, we will all be figuring out how we can [deleted]. It is hardly real arms control in that sense.

One other question.

Back in the fall of 1987, Senator Hatfield had a report that came from the Appropriations Committee staff over there. It was called America's plutonium cushion.

It compared plutonium requirements in the annual stockpile memorandum with the actual amount of plutonium being used, based on what Congress actually authorized, according to the report.

I quote from it: "The 5-year projection of warheads contained in the 1984 budget request and the 1983 NWSM was overestimated, on average, by [deleted] percent, as compared to the actual warheads which were built or are now projected. These annual stockpile documents may be useful in setting goals for warhead production. On the other' hand, they never should be viewed as sacrosanct."

Now, the report suggested that the Pentagon may be dragging its feet with respect to retirements which also affect requirements.

Has the administration compared the requirements spelled out in the annual stockpile memorandum over the last several years with the actual utilization of these materials?

General HERRES. Yes, sir. In fact, I think that is what we are doing right now, and we do it routinely. We do it, of course, when we prepare the nuclear weapons stockpile memorandum.

Senator GLENN. Well, the thrust of what that report said—and I did not exactly buy on to all of that report when it came out, I remember that—but the point he is making is that our estimates have been off by some [deleted] percent. Are we taking that into account? What are we doing?

General HERRES. Our estimates on what we were actually going to build? I think that is the way I read that, though I'm not sure.

Senator GLENN. Yes, the 5-year projection of warheads contained in the 1984 budget request, in the 1983 NWSM, was over-estimated, on average, by [deleted] percent, as compared to the actual warheads which were built or not projected.

General HERRES. If you can stand to look at that chart again——

Senator GLENN. Oh, no, not the last one, please. [Laughter.]

General HERRES. But that is the one that tells the story.

[Chart deleted.]

Senator GLENN. Now you can prove anything to me off that one. [Laughter.]

General HERRES. Here is 1984, so we are right there [indicating], at the top of this, and here is the projection [indicating]. Here is the 5-year period that you are talking about [indicating].

So I can see why what was written was written. You see, we have that build there [indicating], that series of builds. [Deleted.]

So what the report probably is referring to is this [deleted] [indicating]. It is probably suggesting that we over-estimated our requirements back here, in this particular point in time [indicating].

Now, a lot of things have happened since 1984. The world has changed a lot, as have our requirements and projections.

But what we have also done to deal with this is put this [deleted] weapons per year projection in. All of this mess in here [indicating] I think should clearly show that [deleted] is not a conservative figure. That is a realistic figure. And the question you asked earlier [deleted].

Now, my personal view is—and I was one of the guys who drove for a less than conservative position—it is that we can make it. I think that we can do that. [Deleted.]

There is a certain amount of uncertainty as to what weapon systems will actually be approved. Follow-on to Lance, as you know, right now is an issue. That will change that picture out there all by itself.

Where we will end up and how many Trident boats we will actually build will be a budget issue. So will Peacekeeper and so on.

So, that is the best we can do. But I think we have addressed that problem.

Dr. **Duncan**. Senator, may I add a comment to that?

Senator **Glenn**. Sure.

Dr. **Duncan**. One of the things that this particular Council has done—we came into existence by law, which Congress passed at about the time of that last curve on the chart that General Herres showed—one of the things that we became quickly aware of was how we were throwing the Department of Energy up and down in our requirements.

General Herres took the lead. He was the first Vice Chairman of the Joint Chiefs, the first person in a position that could do something about it. He took the lead in trying to smooth out our requirements, which would help run a more efficient Department of Energy. That is really the most important issue that the Nuclear Weapons Council has been addressing in the last 1½ or 2 years, I would say.

I think you could say that we are going to be doing business differently in the future, unless there is some great emergency that creates it than occurred during the time that that "was written," that you have just described.

Senator **Glenn**. What questions should we have been smart enough to ask but did not this morning?

General **Herres**. Well, I would like to make one point, Senator. It could have been a question, I suppose.

I guess there are a couple of them.

We really have to be sure that everybody understands we do need new production reactors. You know, regardless of whether or not we solve the problem—and we do have to solve the problem down at Savannah River—we need to do both.

I personally would not choose to put one as a higher priority than the other. I think both are of equal priority.

Clearly, from the charts you saw, we have to get Savannah River going, or we're going to be in deep trouble, even if we do build a new production reactor. If we do get Savannah River going and do not build, or substantially delay, a new production reactor, we're hanging by our fingernails for a longer and longer period of time. We have to get this uncertainty period brought to a close.

I think what Troy said about plutonium—[deleted].

With regard to the study that we are doing, which we [deleted]. But we're talking, we're really in the grass with what we can do with that red line coming down that chart.

[Deleted.] But we need to get on with both the Savannah River fix and the new production reactor, and we just cannot waste any more time on the new production reactor.

Senator **Glenn**. Well, I mentioned that in passing a little while ago, about the one or two reactor question. I have not made up my mind about what I want to back or not back in this area, and I am available to be convinced one way or the other.

But if I had to be convinced right now that the average, I'll just telegraph what I think the general attitude here is; it would be mine, as of the moment, if I had to decide this instant, it would be that we think we could probably get Savannah River back on.

Now, that is not a given yet, [deleted].

That's the reason I asked what percentage loss we would have if we go from one weapon system to another: Can you take that material and redo it, and pretty well come out with about the same, close to at least the same amount that you went in with? [Deleted] the 24,000 years that you said is half-life, and that's somebody else's problem at that point.

So, you make an iron-clad requirement for one reactor, I think. The second reactor is a little more of a question mark, and whether in times of budgetary constraints such as we have, whether we have to go with it.

If we're willing to cut off X number of B-2s to get this, get a second reactor, if we're willing to cut the ATF, if we're willing to cut the M-1 tanks—I just don't think we are going to have the money to do everything we want to do. It is going to be a matter of cut and patch, sort of like your last chart, there, when we get done with this authorization bill, this year's bill, unfortunately.

So, when you go for that second reactor and we really start pushing for it—and I am happy to push if I am really convinced the capability is needed—but I think if we have any confidence level that Savannah River is going to come back and at least take care of some of the requirement, then we have to start thinking about maybe we hold that second reactor and look at it again 2 or 3 years down the road, as to whether we then start the second one.

I don't have any question about the first one.

I am just sort of thinking out loud here. This is not very well thought out.

Do you have any comments?

Mr. **Wade**. Certainly we share your concerns about the price tag and where the money is going to come from. I think that is a problem that the administration and Congress are going to have to work on very hard.

I think we are coming from the capacity side of the equation here, Senator Glenn. The problem we have today is aging plant and no capacity, no flexibility. What we have proposed is a way to assure that the Nation does not get itself into that jackpot again. [Deleted.]

Senator **Glenn**. [Deleted.] It is all talk so far, a big U.N. speech, a lot of talk.

I hope it all turns out the way that Gorbachev is talking about, [deleted]. So I am not one of the ones who wants to base our production just on a Soviet speech at the U.N.

Dr. **Duncan**. There is one message that I hope we got across today, and that is that long leadtimes are involved here, and once we get into a problem, it is going to take us a long time to get out of the problem.

We need to act to keep us from getting into a dangerous situation.

Senator **Glenn**. Yes.

Bill, do you have any more questions?

Mr. **Hoehn**. No, sir.

Senator **Glenn**. Does anybody back here have any burning questions still on the slate?

[No response.]

Senator **Glenn**. OK.

This hearing is adjourned.

Thank you all very much.

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR J. JAMES EXON

Senator **Exon**. Mr. Wade, suppose we were to *buy* a Canadian CANDU heavy-water reactor on a turn-key basis and put it at Savannah River. First, how close to "goal" quantities of tritium would a standard CANDU reactor produce? Could it be operated to maximize tritium production, perhaps at some cost to electric power production? What are the non-proliferation implications of such an acquisition?

Mr. **Wade**. CANDU, bought on a turn-key basis, could not produce more than small quantities of tritium. Small amounts might be made in lithium-bearing control rods and through de-tritiation of the heavy water after several years of operation. A major effort, involving tritium target design and significant redesign of the reactor, including changes to operate with more highly enriched fuel, would be required to produce "goal" quantities of tritium. Electric power production would probably be reduced with a fuel-target combination optimized for "tritium" production. Canada has maintained a very rigid posture of non-proliferation. This has included their refusal to sell heavy water to any country that might use it for weapons purposes. They recently passed legislation to bar, for other than peaceful purposes, the sale of tritium recovered from the heavy water in their reactors. It is unlikely a CANDU reactor would be sold to any country for tritium production.

Senator **Exon**. Mr. Wade, one of the options DOE has suggested is the development of target materials for use on light-water reactors. As you know, our existing policy on non-proliferation would preclude the use of civilian nuclear reactors for the production of materials for use in nuclear weapons. Presumably, if there were a grave national emergency, this policy could be revisited. My question to you is about the development of this option. Do any of your recommended target development activities require the use of civilian light-water reactors, or can the development program be carried out using only existing DOE defense facilities.

Mr. **Wade**. The Light-Water Reactor target development activities that are ongoing use only DOE facilities, primarily the Advanced Test Reactor at the Idaho National Engineering Laboratory. The use of civilian light-water reactors to complete the development of the target concept is not part of the current development program.

[Whereupon, at 12:02 p.m., the committee adjourned, to reconvene upon the call of the Chair.]

SAFETY, MODERNIZATION, AND ENVIRONMENTAL CLEANUP OF THE U.S. NUCLEAR WEAPONS COMPLEX

THURSDAY, APRIL 6, 1989

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES
AND NUCLEAR DETERRENCE,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

ENVIRONMENTAL PRIORITIES FOR THE NUCLEAR WEAPONS COMPLEX

The subcommittee met at 9:12 a.m. in room SR-222, Russell Senate Office Building, Senator J. James Exon (chairman of the subcommittee) presiding.

Committee members present: Senators Exon, Levin, Bingaman, Wirth, Warner, and Thurmond.

Professional staff members present: Sherri W. Goodman and William E. Hoehn, Jr.

Minority staff members present: Patrick A. Tucker, minority staff director and counsel, Robert F. Bott, and George W. Lauffer, professional staff members.

Staff assistant present: Mickie Jan Wise.

Committee members' assistants present: Jeffrey B. Subko, assistant to Senator Exon; Christopher E. Paine, assistant to Senator Kennedy; Edward M. McGaffigan, Jr., assistant to Senator Bingaman; Kevin T. Knobloch, assistant to Senator Wirth; Terrence M. Lynch, assistant to Senator Shelby; and Robert M. Soofer, assistant to Senator Gorton.

OPENING STATEMENT OF SENATOR J. JAMES EXON, CHAIRMAN

Senator EXON. The subcommittee will please come to order.

I believe the witnesses have been advised that because of a change in the Senate schedule this morning which mandates that we cannot go beyond 11 for these hearings, we are going to have to move ahead and not give each of our witnesses the time we had earlier hoped.

This morning the subcommittee continues its series of hearings on safety and modernization of the environmental cleanup of the Nation's Nuclear Weapons Complex. The committee has already held three hearings on these matters. On February 2 the full committee held two hearings, one on safety issues at the Savannah River reactor, another on the modernization of the Nuclear Weapons Complex, and on March 2 the committee held a closed hearing on nuclear materials requirements with members of the Nuclear Weapons Council.

Today the subcommittee will hold the first of two hearings on the environmental priorities for the Nuclear Weapons Complex. Today the subcommittee will hear from the Department of Energy and the Environmental Protection Agency. Tomorrow morning we will hear from the General Accounting Office and the Natural Resources Defense Council.

The facilities that produce the materials for our Nation's nuclear deterrent all face serious problems of environmental contamination. This contamination results largely from inadequate methods of disposing of hazardous substances, methods that are no longer acceptable under today's environmental laws. These facilities must be brought into compliance with applicable laws and regulations.

Compliance, however, is only the first step. We need to have a long-range planning process for addressing environmental cleanup. The cleanup cannot be completed in the next fews years, unfortunately. It will take many decades to properly characterize, treat and dispose of these problems. We need to have a sound basis for knowing when and where to allocate scarce funds.

Neither the Congress nor the executive branch has much experience in dealing with a $100 billion problem at a rate of a couple of billion a year. I am pleased that Admiral Watkins has committed himself and the Department to developing a 5-year funding plan for environmental cleanup. I think that effort will make a significant contribution to addressing the problem, and the committee intends to hear from Admiral Watkins before we go to markup.

We in Congress need to review the status of the current environmental cleanup efforts and to hear from those who have been studying these matters. We also need to know whether more money could be usefully spent on the cleanup efforts in the near term, such as the fiscal year 1990 and 1991 budgets, which we will be addressing in the next few months, or whether because of planning for cleanup is still in its early stages more money can be productively applied at this time.

I also think there is a lesson to be learned from other cleanup efforts, and I invite other witnesses to provide us with lessons learned from the Superfund program, both the dos and the don'ts.

We are pleased to have Mr. Troy Wade and Mr. Raymond Berube to testify here this morning, and we appreciate your hard work and dedication in a time of transition in the Department. We are also pleased to have Dr. Bruce Diamond and Mr. Christopher Grundler and Mrs. Lisa Friedman, for the Environmental Protection Agency today.

This hearing must be concluded, as I said, by 11 a.m. Before we begin, I would like to ask my distinguished co-leader of this panel, Senator Thurmond, if he has any comments.

Senator THURMOND. Thank you, Mr. Chairman.

Mr. Chairman, I want to congratulate you on holding this important hearing today. Today's testimony will add to the substantial record on the problem of energy matters that the committee is amassing under your leadership. That record will be of great assistance to the committee in formulating our recommendations to the

Senate about the appropriate level of funding for Nuclear Weapons Complex cleanup activities.

I join you, Mr. Chairman, in welcoming our two panels here today and look forward to hearing their testimony.

As you have indicated, Mr. Chairman, we know that there is a tremendous cleanup bill facing the Department of Energy. Our task this year will be to put into place the process by which priorities can be established to serve as a basis for a long-term plan. We will also be interested in knowing what fiscal year 1990 funds are needed to begin a rational cleanup plan.

As implied in Secretary Watkins' recent letter outlining his waste management plan, this may involve investment in cleanup technologies that were not contemplated in the fiscal year 1990 budget now before the committee.

I will have some questions for our panels at the appropriate time. Thank you, Mr. Chairman. And I want to welcome the witnesses. We are very pleased to have these distinguished people here.

Senator EXON. Thank you very much, Senator Thurmond.

Let us move right along, then. Mr. Wade and Mr. Berube, whichever of you would like to go first—I assume Mr. Wade. If so, welcome back again, Troy. We are always glad to have you come over.

STATEMENT OF TROY E. WADE II, ACTING ASSISTANT SECRETARY FOR DEFENSE-PROGRAMS, DEPARTMENT OF ENERGY, ACCOMPANIED BY RAYMOND P. BERUBE, DEPUTY ASSISTANT SECRETARY FOR ENVIRONMENT, DEPARTMENT OF ENERGY, AND ROGER P. WHITFIELD, ASSOCIATE DIRECTOR, OFFICE OF DEFENSE WASTE AND TRANSPORTATION MANAGEMENT, DEPARTMENT OF ENERGY

Mr. WADE. Thank you, Mr. Chairman. It is always a pleasure to appear before this committee.

Mr. Chairman, my statement for the record is one that was submitted a month ago. Many things have changed in that time.

Senator THURMOND. Mr. Chairman, excuse me for interrupting. I am due at the White House at 9:30 and I almost overlooked it. So I will be back as soon as I can.

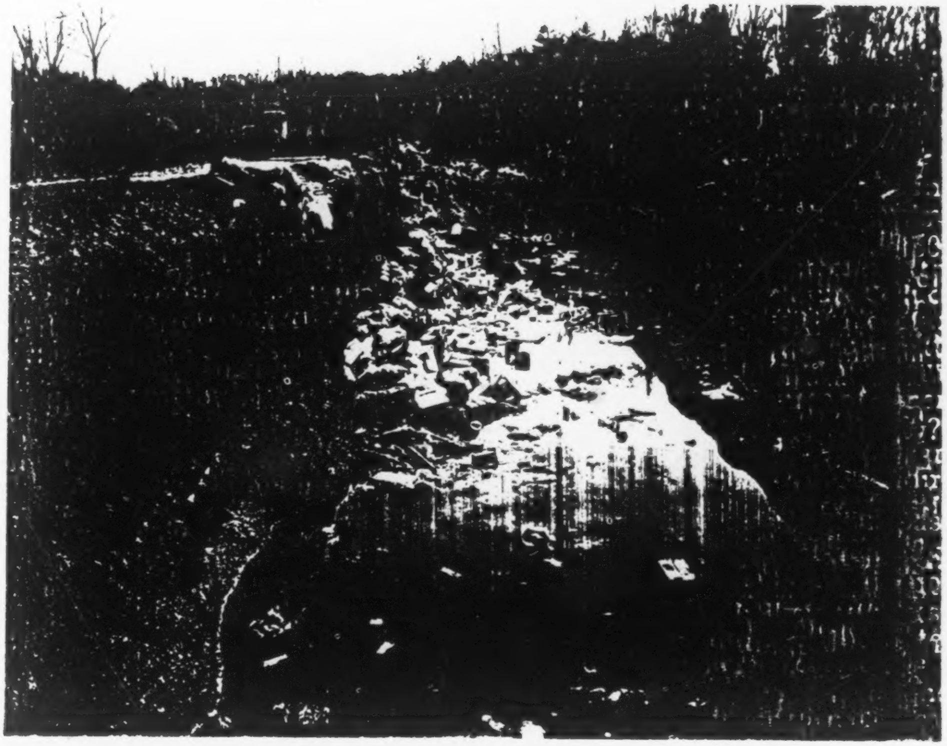
Senator EXON. Thank you. We appreciate your coming and taking care of things at the White House for us.

Mr. Wade.

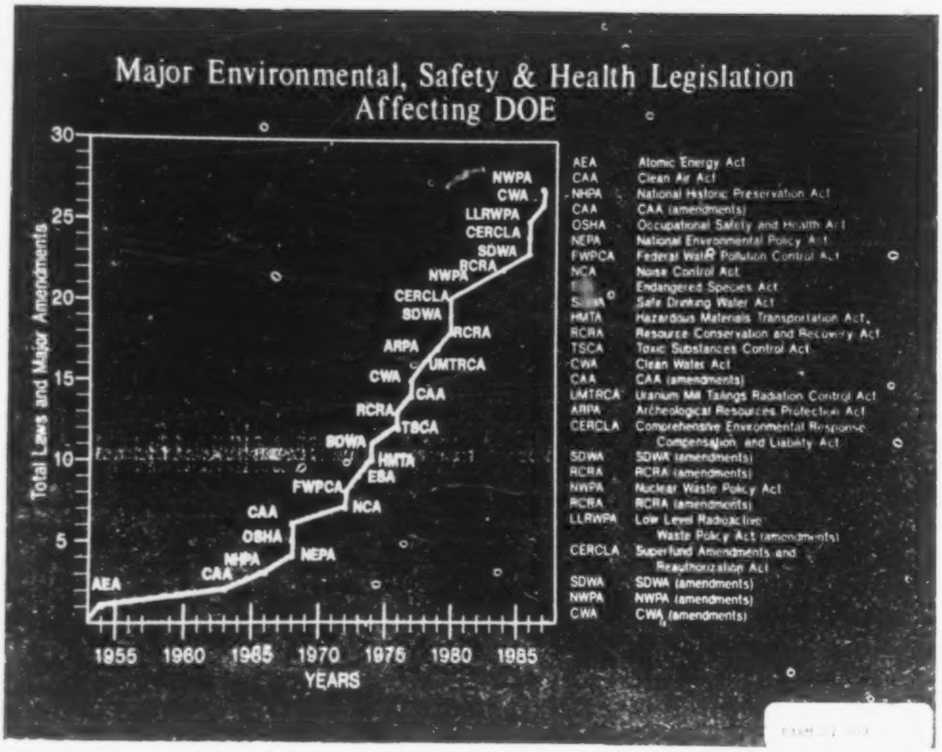
Mr. WADE. I agree.

I would like to make some oral comments this morning, Mr. Chairman, that will reflect not only what we have done in the past but the Secretary's new initiatives that he started in the last month.

As you pointed out, the DOE Nuclear Weapons Complex is one of the largest industrial operations in the United States dealing with hazardous materials. Early waste management practices have clearly proved inadequate for long-term environmental protection. How did we get here? I would like to show you two charts that illustrate one of the three reasons that we have gotten where we are today.



This is representative of the sort of standard cleanup activities, waste burial activities, in the 1950s and 1960s. Those were standard practices.



This chart reflects the environmental laws that have come into being over the last few years. The combination of using practices in the past which were clearly inadequate and the rapidity with which new regulations have come into being have put us well behind the power curve.

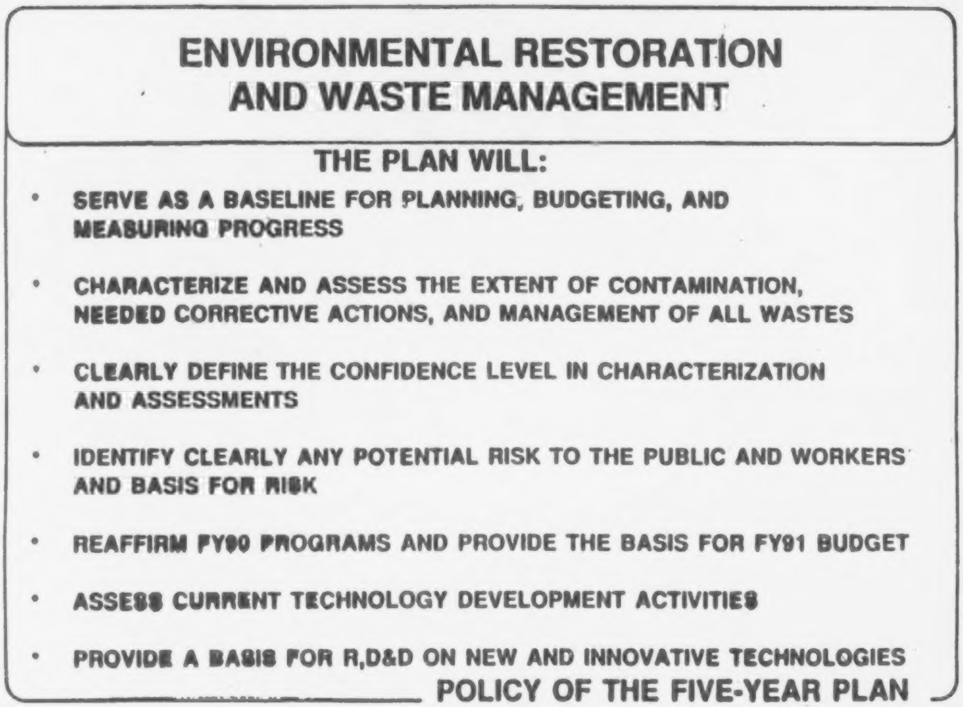
Secretary Watkins and former Secretary Herrington recognized this. Secretary Watkins agrees with the criticisms levied against DOE by those on Capitol Hill and around the Nation regarding our failure to properly or promptly address the serious waste and environmental issues.

Over the past 2 years we have attempted to bound the problem by identifying to first order those things that needed to be done at each site. Using predictive models that admittedly have faults, the Department did indeed compile a list of cleanup needs and projected costs. Unfortunately, many of the cost figures were quickly taken out of context by the media and others and we have been deluged with projections that range from $50 billion to over $200 billion.

These projections have been unacceptable to many and particularly to Admiral Watkins. In order to understand the problems from a technology viewpoint and to restore credibility to the program, he has instituted several new initiatives.

One of his first priorities has been to strengthen DOE's nuclear waste management activities, including environmental compliance and cleanup, by appointing a special assistant, Leo Duffy, to oversee DOE's defense waste programs and to coordinate all other waste management activities at DOE sites. Leo Duffy is well known to the waste management community in the United States, having worked many years for Westinghouse, and most recently for Roy F. Weston. The Secretary calls him a walking encyclopedia.

Secretary Watkins has directed Leo and myself to begin the preparation of an integrated 5-year plan that characterizes and prioritizes all cleanup activities at DOE sites and to develop budget quality estimates of the costs associated with those activities.



ENVIRONMENTAL RESTORATION
AND WASTE MANAGEMENT

THE PLAN WILL:

- SERVE AS A BASELINE FOR PLANNING, BUDGETING, AND MEASURING PROGRESS
- CHARACTERIZE AND ASSESS THE EXTENT OF CONTAMINATION, NEEDED CORRECTIVE ACTIONS, AND MANAGEMENT OF ALL WASTES
- CLEARLY DEFINE THE CONFIDENCE LEVEL IN CHARACTERIZATION AND ASSESSMENTS
- IDENTIFY CLEARLY ANY POTENTIAL RISK TO THE PUBLIC AND WORKERS AND BASIS FOR RISK
- REAFFIRM FY90 PROGRAMS AND PROVIDE THE BASIS FOR FY91 BUDGET
- ASSESS CURRENT TECHNOLOGY DEVELOPMENT ACTIVITIES
- PROVIDE A BASIS FOR R,D&D ON NEW AND INNOVATIVE TECHNOLOGIES

POLICY OF THE FIVE-YEAR PLAN

This chart contains details of the directive to us and is similar to the information that was sent to the chairman and others in Secretary Watkins' recent letter to Congress.

The plan will serve as a basis for planning, characterizing and assessing the extent of contamination, defining the confidence level, identifying the risk, reaffirming the fiscal year 1990 program and as the basis for budgets beyond that, and assessing current technology. The plan also will provide a basis for a major new initiative in research, development and demonstration on new technologies.

This 5-year plan will be completed by August and will be developed from data and information submitted by each DOE operations office. Each program that comes in from each of the operations offices will look at the following priorities.

ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

EACH PROGRAM WILL HAVE A PLAN FOR THE FOLLOWING PRIORITY LEVELS:

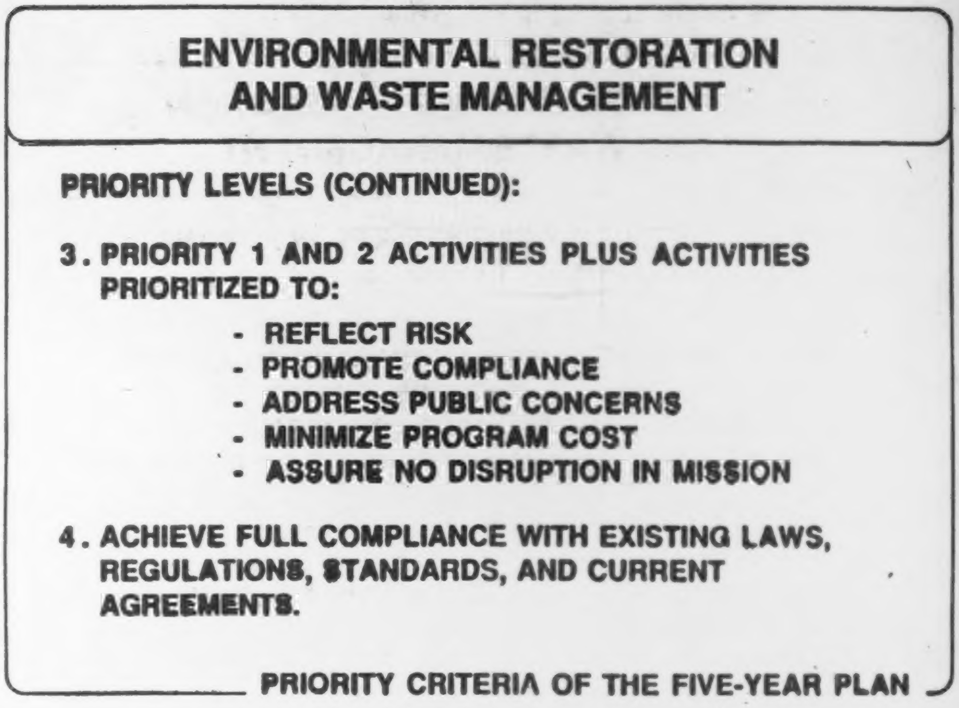
1. ONLY THOSE ACTIVITIES NECESSARY TO ASSURE IMMEDIATE RISK TO WORKERS, PUBLIC, AND ENVIRONMENT ARE REDUCED TO PRESCIBED LEVELS AND PREVENT FURTHER SPREAD OF CONTAMINATION.

2. PRIORITY 1 ACTIVITIES PLUS MEET CURRENT STATE AND FEDERAL REGULATORY AGREEMENTS.

PRIORITY CRITERIA OF THE FIVE-YEAR PLAN

Priority number one, only those activities necessary to eliminate immediate risk to workers, public and environment.

Priority two activities are those which include priority one but which also are necessary to meet current State and Federal regulatory agreements.



ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

PRIORITY LEVELS (CONTINUED):

3. **PRIORITY 1 AND 2 ACTIVITIES PLUS ACTIVITIES PRIORITIZED TO:**
   - **REFLECT RISK**
   - **PROMOTE COMPLIANCE**
   - **ADDRESS PUBLIC CONCERNS**
   - **MINIMIZE PROGRAM COST**
   - **ASSURE NO DISRUPTION IN MISSION**
4. **ACHIEVE FULL COMPLIANCE WITH EXISTING LAWS, REGULATIONS, STANDARDS, AND CURRENT AGREEMENTS.**

PRIORITY CRITERIA OF THE FIVE-YEAR PLAN

Priority three activities would include those in priorities one and two, plus other activities prioritized to reflect risk, promote compliance, address public concerns, minimize costs, and assure that we can carry out the mission of Defense Programs.

Finally, priority four will assure that we achieve full compliance with existing laws, regulations, standards and current agreements.

The Secretary will personally review the contents of the draft plan. He has expressed his intention of working with other executive agencies as well as Congress, affected States and the Indian Nations to assure that we have addressed their concerns and that our priorities are viewed by these entities as being fair, effective and timely.

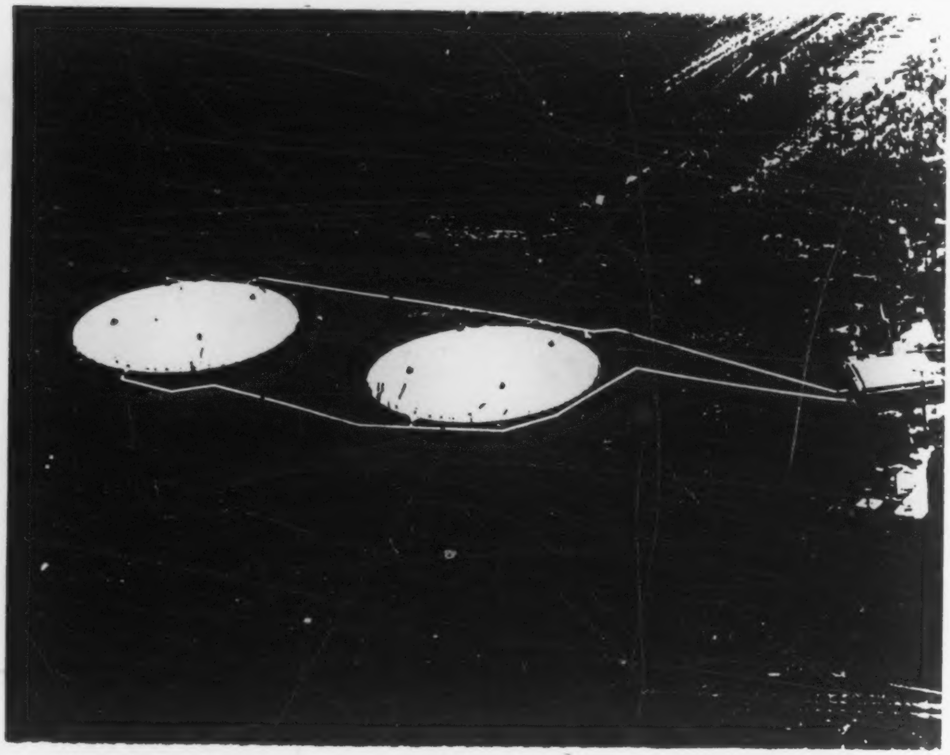
DOE will also work with the National Academy of Sciences, State and Federal regulatory agencies, and technical commissions and the scientific community to complete this 5-year plan. We have also announced plans to establish a similar program in applied research and development, with emphasis on the advancement of environmental remediation technology. The National Academy of Sciences has agreed to participate in this effort as well.

We expect the result of this effort will put DOE's research in remedial mediation on the cutting edge of technology development and to become a recognized world leader in the area.

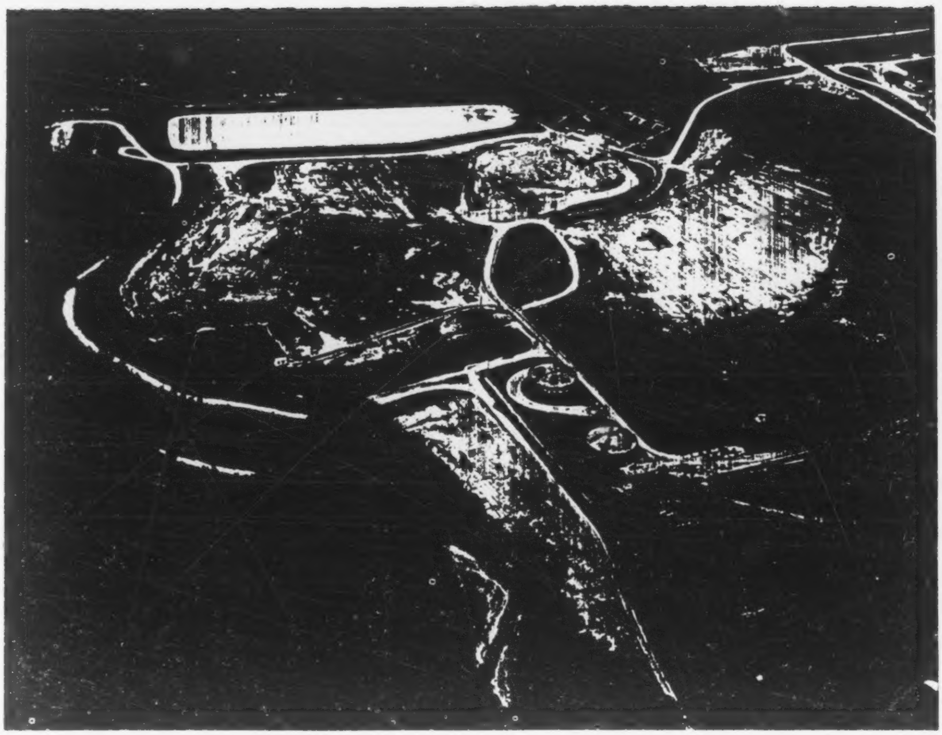
At the same time that we are developing detailed plans on how we propose to approach ongoing and future activities, significant progress is being made throughout the Nuclear Weapons Complex in attempting to achieve compliance. We are proceeding at full speed. Real progress has been made in the area without diminishing our ability to support this country's nuclear deterrence.

Rather than just study—which has been the accusation—we have made some real progress and I would like to show a few examples of that.

At the Feed Materials Production Center near Fernald, the stored waste backlog has been reduced by 40 percent, from 90,000 to 54,000 drums equivalent. Interim RCRA closure of pit 4 is under way with an EPA-approved clay cap.



This slide shows the K-65 silos at Fernald which hold the old Belgian Congo material with very high radon gas emissions. This is a "before" picture.



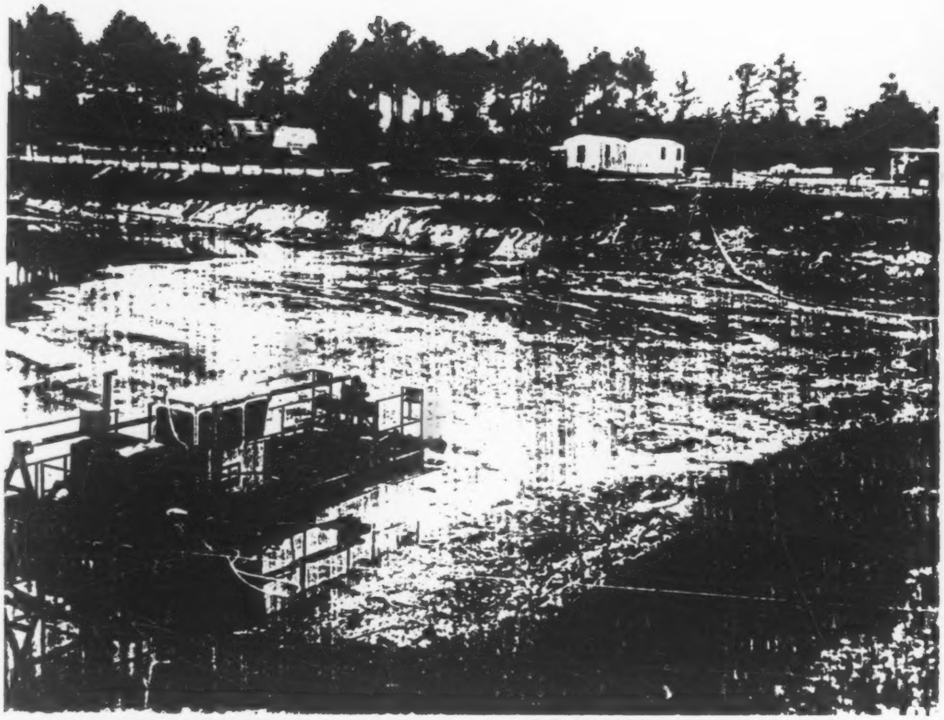
And this is a picture of those same silos after they have been upgraded.

Continuing at Fernald, construction of the storm water retention basin sufficient to hold a 10-year, 24-hour storm was completed in December 1988, satisfying a requirement of the consent decree between DOE and the State to eliminate off-site surface water contamination.

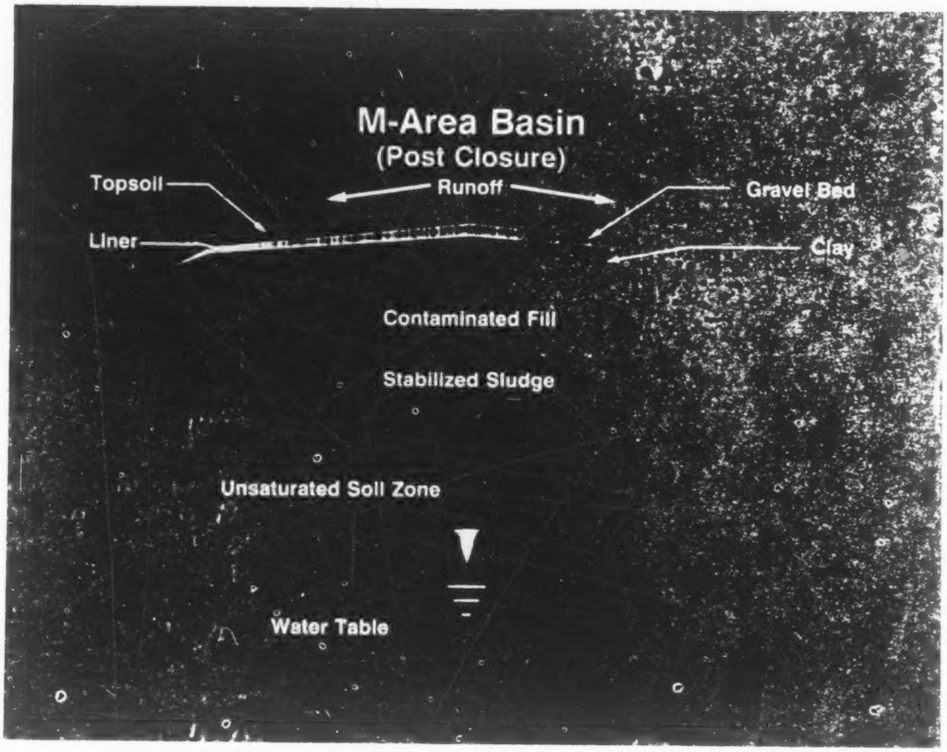
At the Savannah River plant, the closure plan for F&H seepage basins is being reviewed by the State and EPA. The new effluent treatment system began operation in November to eliminate the discharge of separations process wastewaters to seepage basins.

This next chart depicts the M area settling basin closure now in progress.

This was a settling basin which had in it "both" radionuclides, heavy metals, and organics.

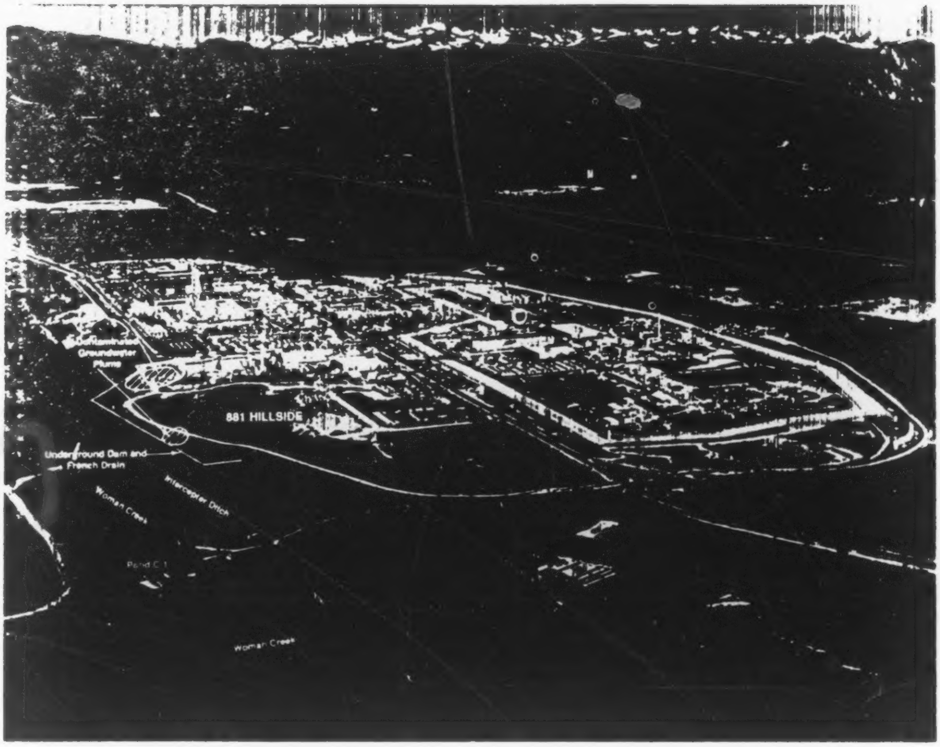


Mr. WADE. This next chart shows that the water has been pumped off and the sludges are now being collected and solidified.


M-Area Basin
(Post Closure)
Topsoil
Runoff
Gravel Bed
Liner
Clay
Contaminated Fill
Stabilized Sludge
Unsaturated Soil Zone
Water Table

And the final chart shows the closure in which contaminated fill will be put over the stabilized sludge and then a cap over the top of that to assure that rainwater and runoff will eliminate the direct discharge of untreated liquid waste to the environment.

At the Rocky Flats plant in Colorado sludge is being removed from solar ponds and final closure is scheduled for 1996.


Contaminated Groundwater Plume
881 HILLSIDE
Underground Dam and French Drain
Interceptor Ditch
Woman Creek
Pond C-1
Woman Creek

Groundwater contaminated with volatile organics from the 881 hillside area is scheduled for treatment and reinjection starting later this year. The 881 hillside is contaminated with organics. An elaborate system of underground dams and french drains has been installed. The water will be pumped out, the organics removed, and the water reinjected.

Shipments of TRU waste to Idaho have been resumed and actions have been taken to address the WIPP supplemental EIS and land withdrawal efforts to assure timely opening of the WIPP facility.

I want to show you one of the more dramatic before and after slides taken at the Oak Ridge low level disposal site.

This photo was actually taken at Oak Ridge and shows how waste was dumped in open trenches in the 1950s.

Senator EXON. Troy, let us be clear, at least we hope that was all low level waste?

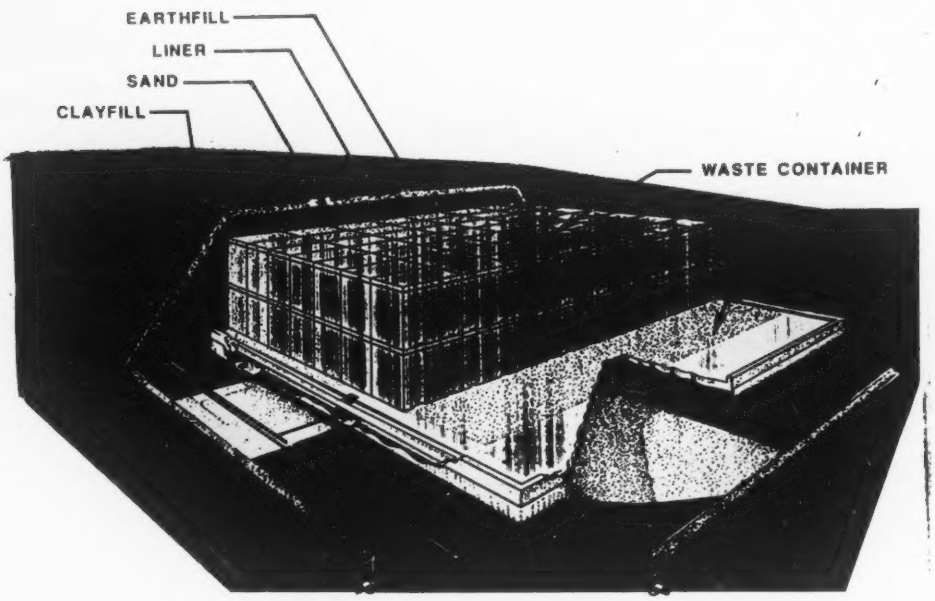
Mr. WADE. Yes, it was all low level.

Senator EXON. What year was that picture taken, do you know?

Mr. WADE. In the 1950s. I can be more precise, Mr. Chairman. I cannot right today.

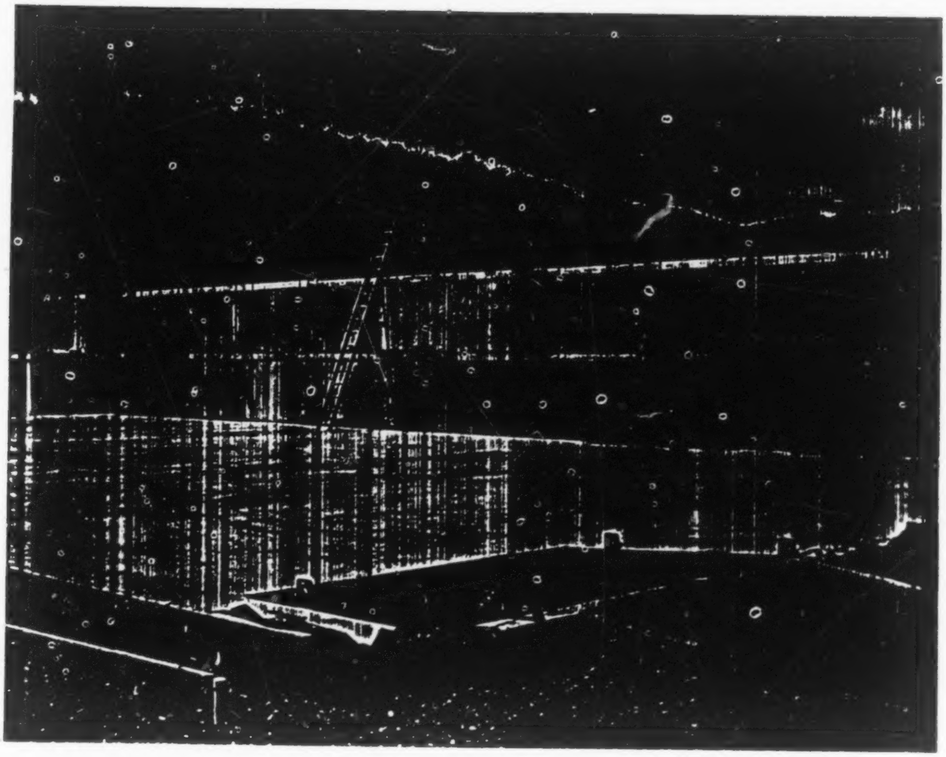
Senator EXON. But in the 1950s sometime?

Mr. WADE. Yes, sir.


EARTHFILL
LINER
SAND
CLAYFILL
WASTE CONTAINER

This is an artist's conception of the facility where waste has been put into containers which are on a concrete pad, which are on a clay fill, a liner designed to go over the top once again to prevent any rainwater from breaching those containers and carrying the contamination back into the environment.

This was an artist's conception of what was to be done, and now I want to show you a photograph of the actual thing.



So we are indeed proceeding slowly, but we are proceeding with the cleanup.

I want to report quickly some examples of environmental technology research and development. For example, the plasma reactor that is being developed at the magnetohydrodynamic facility in Butte, Montana, will treat hazardous waste at temperatures in excess of 17,000 degrees Fahrenheit to break down the hazardous materials into elemental components of carbon, hydrogen, and oxygen and reduce the hazard to the environment. This is indeed advanced technology that may apply to future cleanup activities.

Similarly, vacuum extraction of trichlorethylene at the Lawrence Livermore site 300 is demonstrating effective cleanup of groundwater contaminated with solvents. These are only examples of what we will cover in the individual site sections of DOE's 5-year plan.

My purpose for discussing these examples is to show that we are proceeding with the immediate cleanup, confinement and technology development in parallel with developing these 5-year plans.

In conclusion, Mr. Chairman, the administration's commitment to environmental protection and worker and public health safety at DOE facilities is stronger than ever. President Bush has highlighted this effort as one of his major initiatives and his revised fiscal year 1990 budget request reflects that commitment.

Accordingly, funding for ES&H activities has increased within DOE to nearly $3.1 billion in fiscal year 1990, a 30-percent increase over the previous fiscal year. There are those who would argue that even more money should be dedicated to environmental cleanup activities or to some other goals of the Department. Secretary Watkins has carefully studied this situation and concludes that the fiscal year 1990 budget estimate represents the maximum dollars we can properly and appropriately expend until we complete the 5-year plans.

Our efforts to develop a comprehensive 5-year waste cleanup plan will help to assure that immediate problems are confined and corrected, and will assure that the longer-term cleanup effort is well focused and is based on credible science and technology and that all the plans and the data are reviewed and accepted by such recognized organizations as the National Academy of Sciences.

This in turn, we hope, will help to reestablish DOE's credibility with Congress, with the American public and with regulatory bodies at both the Federal and State level.

Mr. Chairman, that concludes my opening comments.

[The prepared statement of Mr. Wade follows:]

STATEMENT OF
TROY E. WADE II
ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS
U.S. DEPARTMENT OF ENERGY

Mr. Chairman and members of the committee, I appreciate the opportunity to testify on the methodology being developed by the Department to allocate resources among various weapons complex sites for environmental cleanup and our FY 1990 request for the cleanup program. I am accompanied today by Ray Berube, Deputy Assistant Secretary for Environment in the Office of Environment, Safety and Health.

INTRODUCTION

The Department of Energy has the statutory responsibility for the production of nuclear materials and weapons for national defense purposes. To carry out this responsibility, the Department's Office of Defense Programs operates a large industrial complex employing over 60,000 people at various production, processing, testing and R&D installations across the country. As a result of over 45 years of operations, this complex has generated, and will continue to generate, radioactive, hazardous and mixed wastes. Such wastes must be managed, treated and disposed of in compliance with the requirements of applicable Federal and State environmental regulations and standards. However, compliance is proving to be a difficult problem. The Department is operating its weapons complex with facilities that were constructed more than 30 years ago. They were designed and built to standards and regulations different and less stringent than those of today. Consequently, the

Department's facilities are experiencing environment, safety and health compliance problems and are facing a massive cleanup responsibility in the face of today's requirements. The Department is committed to addressing these problems in a manner which promotes public health and safety and environmental quality.

These problems have not gone unnoticed in the past. Within available funding, we have taken the steps we could to upgrade some facilities and capabilities. In retrospect, some of those past decisions were focused on meeting national security needs in the short-term versus a more balanced consideration for the long-term needs of the nuclear weapons complex, the environment, safety and health requirements and upgrading technology and practices. In addition, with newly legislated requirements, changes in policy direction, and increasing fiscal pressures over the past few years, balancing all of the mission requirements has been and remains a major management challenge. National Defense is dependent on compliance with both legislated requirements and DOE regulations, since failure to do so can result in shutdown of weapons and materials production facilities.

SCOPE OF THE DEFENSE PROGRAMS ENVIRONMENTAL CLEANUP PROBLEMS

In producing the nation's nuclear arsenal, some very toxic and radioactive substances were generated. A variety of industrial practices were used to handle generated wastes. By today's standards, some of those practices should have been different; for others, our knowledge of potential environmental effects of the waste materials was incomplete.

The Department's policy is to assure compliance with all applicable state and Federal requirements. To this end, the Department has sought to enter into compliance agreements with the appropriate states and the U.S. Environmental Protection Agency. These agreements establish schedules to be followed by the sites for the completion of assessments, remedial investigations, feasibility studies, remedial actions and unit closures in addition to the implementation of corrective actions.

In 1988, the Department reached agreement with the Environmental Protection Agency on model provisions for Federal Facility Agreements to be negotiated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). In November 1988, the Department signed its first Federal Facility Agreement with these model provisions for remedial actions at the Lawrence Livermore National Laboratory. An Intent to Execute the Hanford Agreement has been signed by the state of Washington, the Department of Energy and the Environmental Protection Agency addressing the the Resource Conservation and Recovery Act (RCRA) and CERCLA requirements for the Hanford site. Similar negotiations are underway at several other facilities in the nuclear weapons complex.

In December of 1988, the Department published a report entitled, "Environment Safety, and Health Needs of the U.S.," Department of Energy (DOE/EH-0079). This report identified significant resource needs to accomplish cleanup of defense complex facilities; a range of $34 billion to $63 billion for cleanup of Defense Programs facilities and up to $4 billion for decontamination and decommissioning of inactive Defense Programs facilities. These figures are estimates and do not represent budget quality numbers.

Another Departmental report, entitled Environmental Survey Preliminary Summary Report of the Defense Production Facilities (DOE/EH-0072) dated September 1988 sets forth the results of one aspect of the Department's overall long-range program for reducing environmental risks associated with its operations. Such results are intended as an initial environmental baseline from which uniform, comprehensive, long-range plans for correcting identified problems may be developed. The report provides a preliminary technical ranking of potential hazards to public health and the environment that may be posed by discrete problems identified in connection with certain Defense Programs sites. These results, in combination with the results of the needs assessment, provide an indication of the potential urgency and possible magnitude of the resources that may needed for cleanup of such Defense Programs sites.

As part of the Defense Programs Environmental Restoration program, the Office of Defense Waste and Transportation Management has recently developed a system to assist in making management decisions with regard to the allocation of funds during the budget development process. Termed the Program Optimization System, or POS, its objective is to achieve, from a fixed amount of funds, the greatest overall benefit with regard to improved health, safety and environmental protection. The system uses the Hazard Potential Index ranking of the Department's Environmental Survey Report mentioned above as a measure for estimating the degree of public health and safety risk. The system was developed in response to direction from this committee to establish a priority system to ensure that available funds would be applied "so as to achieve the greatest benefits to health, safety and protection of the environment from further damages" (House Report 100-58, page 316). Developed during the past year, the system has not yet been fully proven throughout a full budgetary cycle. However, it has provided Defense Programs with a systematic and efficient framework for use in focusing management insight during the budget development process. We expect the POS to be of increasing utility in the Environmental Restoration program budget development.

PROGRAM OPTIMIZATION SYSTEM DESCRIPTION

Defense Programs' POS is a formal decision-aiding methodology based on certain decision analysis techniques that are well documented in the professional literature. It involves an analytical process that (1) explicitly provides estimates of projected benefits expected from the mitigation of risk derived from alternative Environmental Restoration program funding levels and (2) identifies the funding level that optimizes projected total benefits at minimum total projected cost.

The system has several important characteristics. It makes use of the field offices' detailed knowledge of conditions at their sites and allows a large measure of field office flexibility in the design of program activities to deal with such conditions. Furthermore, the system does not require "all or nothing" decisions about individual projects. Instead the Defense Programs POS allows each field office to propose different levels of effort for a set of activities, depending on the budget level under consideration. Explicit consideration of such partial funding options allows field offices to propose the most cost-effective programs at each budget level.

POS METHODOLOGY FOR APPLICATION IN THE BUDGET PROCESS

Under the procedures prescribed by the system, each field office develops several sets of alternative cleanup activities, each set reflecting a different proposed funding level. The range of funding levels will, in general, include the target level prescribed by headquarters in the field office budget call.

Each field office assesses its alternative budget proposals against the objectives selected so as to provide a basis for estimating the value that would be expected to result from the funding of such proposals. Four objectives are viewed to be most important: (1) maximize public health and safety, (2) maximize regulatory responsiveness, (3) minimize current and future public, State and community concern, and (4) minimize program costs. In addition to these objectives, one constraint is used, viz., the exclusion from consideration of funding levels that, because they result in gross failure to meet regulatory requirements, pose a threat to the continued execution of the Defense Programs mission.

Each set of activities is scored according to a scale designed to quantify the degree to which such activites are expected to achieve or otherwise promote the benefits associated with the designated objectives. Final scores are weighted, using value tradeoffs specified by headquarters, to develop an aggregate measure of value for each proposed budget. By far, the heaviest weight is placed on health and safety. The next greatest weight is placed on regulatory responsiveness, including compliance with schedules in enforceable interagency agreements. The scales used to measure projected achievement and the rules of scoring are standardized by headquarters directive to ensure uniformity. Field office scores are reviewed, and if necessary revised, at a workshop involving all of the field offices and the headquarters program management staff. This workshop process serves as an internal peer review.

Constrained only by the total amount of funds characterizing each budget level, the overall Defense Programs Environmental Restoration program budget can reflect any combination of proposed funding allocation. Since there are a relatively large number of facilities and sites, and each could, in theory, receive any one of several funding allocations, there are a very large number of possible funding combinations. Computer techniques are, therefore, used to calculate the overall program value associated with each such combination. Those combinations at each current fiscal year budget level resulting in the greatest overall projected value for any given total program cost are identified as "optimal." That is, no other set of program activities associated with a given current budget level is expected to result in a higher value at either equal or lower total cost. In the absence of other, overriding considerations, budget, amounts at each level of total funding are allocated in accordance with such optimal combinations.

Because the POS is a decision-aiding, rather than a decisionmaking tool it can provide only a partial and approximate accounting of the factors important to budget decisions. Judgment is required to apply outputs of the analysis to the actual allocation of funds. Consideration of other factors, primarily of a judgmental nature, may provide sound justification for modifying the results derived from the formal optimization procedure. The need for program continuity, long-term planning stability, anticipated regulatory changes, or results of policy decisions are examples of factors that may affect such allocation.

APPLICATION OF THE POS IN THE FY 1990 DEFENSE PROGRAMS BUDGET REQUEST

The POS was applied twice in the development of the FY 1990 budget request for the Defense Programs Environmental Restoration program. These applications took place before and after Congressional action on the FY 1989 Departmental budget request. The second application took into account the revised funding level for FY 1989 for the Environmental Restoration program and any new information available from the field offices on the status of planned remediation acitivities since the intial POS application.

Budget development for cleanup activities included application of the POS to sixteen major Defense Programs facilities. The proposed FY 1990 budget supports tasks that support the departmental goal of compliance with applicable laws and regulations for response to uncontrolled releases of hazardous wastes and substances at inactive sites on Defense Programs installations. These tasks reflect an orderly continuation of response actions at these sites following the approach indicated by the results of the Department's CERCLA/SARA Installation Assessments completed in 1988. The tasks also reflect, to the extent possible under the budget for FY 1989 and that proposed for FY 1990, the results to date of ongoing negotiations with Federal and State regulators under Federal Facility Agreements, Consent Order/Compliance Agreements and RCRA corrective action requirements. The budget request supports a remediation approach which the Department believes is consistent with the intent of the CERCLA/SARA National Contingency Plan and also reflects the concerns of Federal and State regulators.

A review of the rankings in the Department's Environmental Survey Preliminary Summary Report referred to earlier in this testimony indicates no great disparity in content with the remediation activities being planned by the Department's field offices. The budget request supports an orderly remediation of these ranking units. Based on these considerations. we do not believe that significant changes to the Environmental Restoration program plans and tasks are necessary at this time in response to the Environmental Survey Preliminary Summary Report.

SUMMARY

The Department's $2.0 billion request for environment, safety and health and waste management efforts includes more than a doubling of the amount for cleanup to $401 million. These environment, safety and health activities are consistent with the needs identified in the needs assessment report provided to Congress in December, 1988.

As noted in the December 28, 1988 letter to you from Mr. Troy Wade, Acting Assistant Secretary for Defense Programs , there has been much publicity associated with the extent of the necessary environmental cleanup at defense complex sites. Most of the publicity has been critical and little recognition has been given to the environmental accomplishments of the past few years. The Environmental Restoration Program Optimization System that I spoke of here today is one of the more recent examples of these accomplishments. It shows just one of the ways that we have been moving ahead to address those past problems. Some of our other accomplishments are highlighted in the enclosure to the December letter. I request that a copy of that letter be inserted in the hearing record.

Senator EXON. Thank you, Mr. Wade.

Mr. Berube.

Mr. BERUBE. Mr. Chairman, I do not have a statement.

Senator EXON. Before we go to questions, in the interests of giving our witnesses ample time to make their presentation, I would like to go to the other panel that we have that are presently seated. I do not know in which order we should be taking these other people, but, Mr. Diamond, would you please go first.

STATEMENT OF BRUCE DIAMOND, DIRECTOR, OFFICE OF WASTE PROGRAMS ENFORCEMENT, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY H. CHRISTOPHER GRUNDLER, DIRECTOR, FEDERAL FACILITIES HAZARDOUS WASTE COMPLIANCE OFFICE, ENVIRONMENTAL PROTECTION AGENCY, AND LISA FRIEDMAN, ESQ., ASSOCIATE GENERAL COUNSEL, ENVIRONMENTAL PROTECTION AGENCY

Mr. DIAMOND. Yes, Mr. Chairman. I am Bruce Diamond, Director of the EPA Office of Waste Programs Enforcement. I will make the opening statement for EPA and the other panelists will help me answer questions that you may have.

We have submitted written testimony for the record. In the interest of time, I will simply make some very brief opening remarks.

I would like to start by setting a regulatory framework for you so that I can explain EPA's role in the process of the cleanup of DOE facilities. I will be talking this morning about DOE obligations under the Resource Conservation and Recovery Act and under Superfund.

Superfund or Comprehensive Environmental Response, Compensation and Liability Act, or CERCLA, basically deals with the cleanup of past contamination. RCRA, the Resource Conservation and Recovery Act, has really two components. It deals with ongoing operations which involve hazardous waste and it deals with the cleanup of certain past practice units at facilities which deal with hazardous waste.

Let me speak first about the Superfund process. Superfund, I should say preliminarily, provides very broad authority over DOE facilities dealing with the cleanup of any hazardous substances, and the definition of "hazardous substances," it is important to note, includes radionuclides.

The process begins with a preliminary assessment and site investigation, which is a very preliminary study of the site conducted by the Department of Energy. That information is then provided to EPA. It is run through what we call the hazard ranking system, in which it is scored based upon a system for scoring sites which applies to all sites, private and public, to assess the relative risk that that site poses to public health.

If it scores above the cutoff, which is 28.5, that site will then be proposed for the national priority list. Once it is placed on the national priority list there is then a statutory deadline of 6 months in which what we call a remedial investigation and feasibility study must be commenced.

The remedial investigation and feasibility study is a very comprehensive study of the site designed to assess the public health and environmental risk posed by the site and to set out the various alternative remedies which may be available to deal with those risks. That is, it is designed essentially to provide the information that will allow remedy decisions to be made.

To manage this process—that is, the process of commencing these comprehensive studies and then doing the work that needs to be done—EPA and the Department of Energy enter into what are called interagency agreements. The interagency agreement contains a detailed schedule of activities to be carried out at that facility. In most cases now the primary emphasis of those agreements is on commencing these comprehensive studies.

But it must be emphasized that where immediate risks are present there will also be requirements to deal with those immediate risks during the interim.

The agency has made a conscious effort, with the cooperation of DOE, to also involve the relevant States in these agreements, and wherever possible these will be three-party agreements—with DOE committed to carrying out the work and EPA and the State in an oversight capacity.

Within 15 months of the completion of that investigation, the comprehensive investigation, the statute requires that on-site remedial measures commence. The remedial measures are selected by an approach in which the EPA and DOE confer and a remedy is selected. There is a dispute resolution process in case no agreement is reached, with the ultimate decisionmaker under these interagency agreements being the Administrator of EPA.

That is the Superfund approach to the problem. Let me speak briefly about the Resource Conservation and Recovery Act. I must mention here that RCRA does not apply to radionuclides. It only applies to chemical hazardous waste and to mixed wastes—that is, wastes which are a mixture of chemical waste and radioactive waste.

If the DOE facility generates or otherwise handles a hazardous waste, then it is subject to RCRA. It will be subject, as I mentioned earlier, to two sets of requirements. One set consists of operational requirements—the proper handling of the materials, proper storage, labeling requirements, a manifest system if the material is shipped offsite, a variety of other very important requirements including groundwater monitoring requirements.

In most cases, States have been authorized to carry out this aspect of the Resource Conservation and Recovery Act, so it will be primarily a matter between the State and the DOE facility to assure that that facility is operating in compliance with those day-to-day operational requirements. EPA will play a role and will provide assistance to the States. In those States where the State is not authorized to carry out the program, EPA will carry out that frontline responsibility.

The other important requirement of RCRA is a requirement to clean up what are known as solid waste management units at regulated facilities, so that if RCRA applies to a DOE facility there is an obligation to clean up old past practice units which handled any form of solid waste if there is a release of hazardous waste or hazardous waste constituents into the environment.

Those cleanups will be governed by either an order issued by EPA or under the permit which is issued to the facility. In other words, the permit will not only contain the operational requirements for the facility but will contain a section setting out those requirements dealing with long-term cleanup of these solid waste management units.

Our approach, Mr. Chairman, is basically to deal with these facilities on a site-by-site basis. The primary responsibility is in EPA's regional offices, working very closely with the appropriate States, to deal with the facilities, to make judgments on a site-by-site basis which regulatory authority is most appropriate, how to coordinate the various regulatory authorities, which would not only be the Federal authorities but in some cases would be State authorities which may apply to that facility.

Our hope, as I said, is to enter into three-party agreements as comprehensive as possible which would deal with both Superfund and RCRA requirements, wherever we can do that, to assure that the State and EPA and DOE have agreed upon the measures which need to be taken. Both those measures which need to be taken in the short term on an interim basis and the long-term studies and then cleanups which need to be done. We all know many of these cleanups will last over many years.

The current status is that there are a number of DOE facilities which have been proposed for the national priority list. We anticipate that several more will be added to the list. We are also achieving some significant success in entering into agreements with DOE facilities dealing with the cleanup of those facilities. In the cases that have occurred so far we have been able to achieve success in bringing the States into those facilities so that they are true three-party agreements.

During these negotiations priorities for the cleanup of the facility are set out and, as I said, a very detailed schedule of activities is laid out in the agreement. If we do not have full information as to the ultimate remediation of the facility, we will have a process for studying the problem and making decisions as to what the ultimate remedies need to be.

In most cases, we are in the investigation stage, but there are a number of places in which major interim measures are being carried out. This was mentioned in the previous testimony. We have some examples in the written testimony which has already been submitted to the committee.

I know the committee is interested in knowing what we have learned from Superfund which we can apply to this process. I think there are two important messages that I want to give here. One, we are providing to DOE through workshops, through training to various Federal agencies, including DOE, and through other measures that experience which we have learned in our carrying out of our Superfund responsibilities nationwide.

We have done that. We will continue to do that. We are making ourselves available to DOE to do transfer of that kind of information.

And second we have learned that while there may be criticism in many cases of the fact that a lot of studies are going on, proper comprehensive studies are absolutely crucial to determining the long-term permanent solutions to these problems. It is an unfortunate fact that an extremely complex facility those studies may take several years, from 2 to 5 years in some cases.

We will do everything we can to make sure those studies occur as quickly as possible, but we will also have to make sure that those studies are done properly and that at the end of them the information is adequate to make the proper choices.

In terms of establishing priorities, I simply want to say the statutes to some degree drives priorities in the process under Superfund and under RCRA. Under Superfund there is a series of time deadlines governing the commencement of the comprehensive study once a site has been placed on the national priority list, and then governing the initiation of on-site activities.

Under RCRA, the priorities are driven indirectly by permit deadlines which are set out in the statute. There are a series of deadlines by which permits must be issued either by EPA or States to all regulated facilities, including Federal facilities. Those permits, as I mentioned, will contain provisions dealing with long-term cleanup of solid waste management units, and those series of permit deadlines are then in effect driving the process to establish those requirements.

Obviously the priority-setting process is extraordinarily complex. They have to evaluate the various factors that were already mentioned. EPA has been working with DOE on a site-by-site basis to establish those schedules. The process has been working well so far. We are making a good start, although it is just a start on the process.

It is a very significant challenge. We understand DOE is working hard to set priorities and we stand ready to provide any assistance that DOE may need in that process.

We have provided some information to the committee on ongoing interim measures. If the committee would like additional information on that subject or any other subject, for that matter, we will be very pleased to provide it for the record.

That concludes my opening remarks.

[The prepared statement of Mr. Diamond follows:]

STATEMENT OF
BRUCE DIAMOND
DIRECTOR, OFFICE OF
WASTE PROGRAMS ENFORCEMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY

Good morning, Mr. Chairman and Members of the Subcommittee. Thank you for the opportunity to be here today to discuss the implementation of the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund) at the Department of Energy (DOE) nuclear weapons production complex. With me today are Christopher Grundler, Director of the Federal Facilities Hazardous Waste Compliance Office; and Lisa Friedman, Associate General Counsel.

Today I will provide an overview of EPA's activities with regard to both RCRA and CERCLA and describe some of the Agency's future goals for Federal facility compliance. I will also discuss EPA's ideas on establishing priorities for cleanup at the DOE defense facilities. An area I will particularly emphasize is the approach that EPA has developed for the cleanup of these facilities, which involves the development of comprehensive three-party interagency agreements (IAGs) at specific DOE facilities.

I. OVERVIEW

Through enactment of RCRA and CERCLA, Congress empowered EPA to manage hazardous wastes and to remedy the environmental problems caused by improper past management of these wastes and other hazardous substances. To achieve these goals in a uniform manner throughout the country, it is clear that Congress intended that its mandate for action in waste management include those facilities owned and operated by the Federal government.

By the express statutory language of RCRA Section 6001, Federal facilities are subject to the provisions of RCRA and its implementing requirements. Moreover, Executive Order 12088 assigns responsibilities to administrators of executive agencies for (1) the prevention, control and abatement of pollution, and (2) assurance that funds sufficient to attain "compliance with standards" are requested. All active Federal treatment, storage and disposal (TSD) facilities handling hazardous waste must have RCRA permits. In addition, Federal TSDs must address any releases of hazardous waste to the environment.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) makes it clear that Superfund applies to Federal agencies, both procedurally and substantively. The specific requirements for Federal agencies are found in Section 120 entitled "Federal Facilities." Section 120 sets forth a process to ensure that Federal agencies assess and cleanup their hazardous waste sites within specified time frames. Section 120 also requires Federal agencies to enter into an Interagency Agreement with EPA for the expeditious completion of all necessary remedial actions at a Federal facility. This CERCLA Section 120 process provides for EPA and state oversight as well as the opportunity for public involvement.

It is imperative that every effort be made to ensure that Federal facilities achieve and maintain a high rate of compliance with such environmental requirements. And it is important to EPA's compliance and enforcement efforts directed toward non-Federal entities that EPA demonstrate its resolve to enforce hazardous waste requirements at Federal facilities with the same vigor it uses at private facilities.

Because of the nature of the problems at Federal facilities, a major focus in EPA over the past two years has been compliance by DOE with the RCRA and Superfund statutes. This is particularly true of the nuclear weapons complex, which is made up of sixteen major facilities. Essentially all of these facilities have, or will have, compliance or cleanup issues dealing with solid, hazardous or radioactive wastes. Indeed, the majority of environmental problems and associated future expenditures at DOE's nuclear weapons facilities are related to solid, hazardous or radioactive waste issues.

I would like to turn next to the progress that has been made on developing interagency agreements with DOE. This discussion will include the identification of cleanups which can begin in the near-term. I will also outline some of EPA's concerns and considerations on establishing priorities for cleanup at the DOE defense facilities.

II. INTERAGENCY AGREEMENTS

Section 120 of the Superfund law requires that Federal agencies which have Superfund National Priorities List (NPL) sites enter into interagency agreements (IAGs) with EPA to effect the cleanup of those sites. In addition, Federal facilities with RCRA permits must conduct corrective actions for on-site solid waste management units which have releases to the environment. Most of the facilities making up the DOE's nuclear weapons complex are under the jurisdiction of both RCRA and Superfund. Also, a number of state environmental statutes or regulations may be applicable to DOE facilities. Depending on site-specific circumstances at each of these facilities, cleanup can be required either through a RCRA permit (with a corrective action plan), or a RCRA corrective action order addressing hazardous waste releases, or under Superfund as specified through a section 120 IAG.

The general approach EPA is taking for cleanup of the major DOE facilities is the development, in conjunction with the appropriate states, of three-party (EPA, DOE, the state) Superfund IAGs at each facility. This approach has the following advantages:

- RCRA, Superfund, and other requirements can be addressed in one comprehensive document, leading to an overall compliance and cleanup program.
- It allows for the early identification and implementation of cleanup actions which can be

started in the near term, while long-term planning and engineering work proceeds, thereby reducing immediate threats and preventing problems from getting worse and more expensive to remedy.

- The full range of hazardous substances, both chemical and radioactive, can be dealt with in one document.
- The document, once agreed to by all parties, is legally binding and enforceable in Federal District Court by states and citizens.

In order to facilitate the development of three-party IAGs, the EPA, DOE, and the Department of Defense (DoD) developed model language for key sections of these IAGs. The EPA/DOE/DoD model language resolved significant policy issues including enforceability, resolution of disputes, stipulated penalties, review process for the remedial investigation/feasibility study (RI/FS), remedial design and remedial action (RD/RA) documents, funding and jurisdiction. Individual state concerns are to be negotiated on a site-specific basis.

Key features of the model agreement include the following:

- A strong enforceability provision for state and citizen enforcement of the agreement.
- A dispute resolution process which provides a streamlined mechanism to resolve disputes, with the EPA Administrator making the final decision.
- EPA assessment of stipulated penalties in the event of a failure to comply with a final resolution of a dispute, failure to meet certain critical deadlines, or failure to fulfill a term or condition of the agreement associated with a remedial action.
- A streamlined and well defined relationship between EPA, and DOE or DoD for the remedial

investigation/feasibility study, remedy selection, and remedy implementation.

- A funding clause that describes actions DOE or DoD will take to meet their obligations under the agreement.
- A mechanism by which the parties can develop a comprehensive plan for action which satisfies the requirements of both RCRA and CERCLA and addresses overlap of authorities and minimizes duplication of efforts.

The model language is to be utilized by EPA and DOE, or DoD for National Priorities List sites where CERCLA is selected as a lead cleanup authority. The language sets forth the relative roles and responsibilities of the Federal agencies with respect to one another, and with respect to the cleanup of CERCLA sites.

Although the model language does not specifically deal with the state's role in the agreement, EPA recognizes the importance of state involvement at DOE and DoD Superfund sites in site-specific negotiations. The state's interests, and references within the agreement to these interests, are being built into the site-specific agreements within the context of these negotiations.

Since development of the model agreement language, the EPA and the DOE and the states have been very active in development of specific agreements at DOE facilities. During the development of these agreements, the parties have identified or are identifying appropriate cleanup actions which can be started immediately, or in the near future. What follows is a brief summary of ongoing actions at several major DOE facilities. Some examples of site-specific interim actions are described below. Each agreement, consent order, or permit discussed below is a legally binding document enforceable in Federal District Court by the state or a citizen.

- Lawrence Livermore National Laboratory (LLNL) - Superfund IAG signed by EPA, DOE, and the State of California on November 2, 1988. Comprehensive agreement covering all phases of cleanup, with work to be overseen by EPA and the State. Includes both CERCLA and RCRA obligations.

  Interim Actions - LLNL has begun a pilot study to pump and treat its main plume of contamination using a ultra-violet light/hydrogen peroxide treatment facility to break down the contaminated groundwater and then discharge the product into recharge ponds.
- Monticello Properties - Superfund IAG signed by EPA, DOE, and the State of Utah on December 16, 1988. Comprehensive agreement covering all phases of cleanup, with work to be overseen by EPA and the State.
- Idaho National Engineering Laboratory - RCRA 3008(h) Consent Order for corrective action signed by EPA and DOE on July 10, 1987. Consent Order covers all hazardous waste and hazardous constituent releases at the facility. The facility is currently being evaluated for the Superfund NPL and is likely to be proposed in the near future. Superfund IAG, covering radioactive releases at the facility, scheduled for completion this year.

  Interim Actions - Installation of an alternate water supply.
- Nevada Test Site - This facility is located in Mercury, Nevada, and is the primary nuclear weapons testing location for the Department of Energy. This facility is not currently listed on the National Priorities List but is being evaluated for possible inclusion.
- Feed Materials Production Center (Fernald) - Federal Facility Compliance Agreement (FFCA) signed by EPA and DOE on July 19, 1986. Agreement modified on June 30,

1988 to include enforceability clause: Agreement covers both Superfund and RCRA, as well as other environmental laws. Consent decree filed on December 2, 1988, resolving litigation between Ohio and DOE, requires DOE to continue to comply with FFCA between EPA and DOE. EPA anticipates proposing this facility for the Superfund NPL in the near future.

o Hanford - Agreement reached February 27, 1989 between EPA, DOE and State of Washington to execute a comprehensive cleanup and compliance agreement to address this very complex site. The Agreement covers Superfund cleanup, RCRA permitting, and RCRA closures.

o Mound Plant - Ongoing negotiations between EPA, DOE, and the State of Ohio on a Superfund IAG. EPA anticipates proposing the facility for the Superfund NPL in the near future.

Interim Actions - Stabilization of an off-site source of plutonium contamination.

o Rocky Flats - Federal Facility Compliance Agreement between EPA, DOE and the State of Colorado signed on July 31, 1986, covering both RCRA and CERCLA obligations. The State plans to issue a RCRA permit this Spring which will cover a portion of the facility. The permit will contain closure and corrective action requirements at the RCRA units. In addition, EPA intends to negotiate a comprehensive Superfund IAG with DOE and the State later this year to cover radioactive releases at the facility.

Interim Actions - Measure to control the source of contamination at a surface impoundment.

o Oak Ridge - A final RCRA permit is in place which includes corrective action provisions covering all hazardous waste releases at the facility. In addition, EPA is negotiating a Superfund IAG with DOE and the

State of Tennessee to cover any radioactive releases at the facility. EPA anticipates proposing facility for the Superfund NPL in the near future.

o Savannah River Plant - EPA has issued a final RCRA permit, which includes corrective action provisions covering all hazardous waste releases at the facility. In addition, EPA is negotiating a Superfund IAG with DOE and the State of South Carolina to cover any radioactive releases at the facility. EPA anticipates proposing the facility for the Superfund NPL in the near future.

Interim Actions - Closure of surface impoundments under RCRA; control of contaminated groundwater.

o Pantex - EPA and DOE are negotiating an agreement which will require DOE to investigate all hazardous waste releases at the facility, located in Texas.

o Kansas City Plant - This DOE Defense Facility, located in Missouri, does not handle nuclear material and has not scored high enough for inclusion on the NPL. Instead, the cleanup will primarily be regulated under RCRA. EPA is developing a RCRA 3008(h) corrective action order to address hazardous waste releases at the facility. The order will cover closure of lagoons as well as the operation of a ground water treatment plant. Discharges from the plant, which DOE has operated for some time, are regulated by a Clean Water Act permit.

Interim Actions - Installation of additional pumping wells to remove hazardous wastes and constituents from the groundwater; maximize operation of existing wells to remove hazardous constituents.

o Los Alamos National Lab - This is a non-NPL facility located in New Mexico, and the cleanup will be primarily regulated under the RCRA program. Corrective action to remediate releases of hazardous waste at the facility will be addressed through the RCRA permit.

- Sandia National Lab - This is a non-NPL facility located in New Mexico, and the cleanup will be primarily regulated under the RCRA program. Corrective action to remediate releases of hazardous waste at the facility will be addressed through the RCRA permit.

III. ESTABLISHING PRIORITIES FOR CLEANUP AT DOE FACILITIES

The priorities for cleanup at Federal facilities are currently driven by deadlines established by statute. As detailed in CERCLA Section 120(e), a Federal facility must commence a Remedial Investigation/Feasibility Study within six months of listing on the National Priorities List. Physical onsite remedial action must commence within 15 months after the completion of the investigation and study. Schedules for the implementation of RCRA corrective action are driven by the statutory deadlines for permit issuance. The 1984 Hazardous and Solid Waste Amendments required EPA to issue all land disposal permits by November 8, 1988, all incinerator permits by November 8, 1989 and all storage permits by November 8, 1992.

As EPA develops these comprehensive IAGs with DOE and the states, priorities are established within the agreements based on the relative threats to human health and the environment. Areas of contamination determined to represent higher threats are investigated or addressed by an expedited cleanup response first, while areas which do not represent as great a threat to the environment are scheduled for investigation later.

Federal agencies face potentially enormous cleanup costs. However, these costs will not be realized immediately as DOE and other Federal agencies are still predominantly in the problem identification phase. As these studies conclude and cleanup plans are proposed and selected, potentially expensive construction activities must begin within 15 months.

Planning for the resources to clean up past hazardous waste problems at Federal facilities will require a rational process for determining priorities. Development of this process must start now. Along with assessing the risk to human health and the environment, the process must try to reconcile the statutory requirements for action provided in RCRA and CERCLA with the constraints of the Federal budget process. It must accommodate the interest and concerns of affected states, Federal agencies as well as the public. The task can not be taken lightly and represents a significant challenge. It will require the attention of the states, the coordinated effort of EPA and other Federal agencies and the help of Congress to develop an approach which realistically addresses these concerns. EPA looks forward to working with DOE, the Congress, and others to solve this national problem.

IV. RESEARCH AND DEVELOPMENT FOR DOE FACILITIES

Many of the problems created by past hazardous and radioactive waste disposal will require new technologies to solve. The Environmental Protection Agency has conducted extensive research, development and technology demonstration that covers all aspects of the assessment and cleanup of hazardous waste sites. We have developed substantial technical capability in our Office of Research and Development and Office of Radiation Programs related to hazardous waste risk assessment, technology evaluation and monitoring that should be brought to bear on the DOE problem. Specifically, we have a large technology evaluation program that is working with the private sector on demonstrating innovative treatment technologies. Because a number of Superfund sites have radioactive wastes in addition to hazardous wastes, we have recently completed an assessment of technologies for the remediation of radioactively contaminated sites. We are also presently testing methods of remediating radioactively contaminated soils. Finally, we have in our radiation office a long history of developing comprehensive risk evaluations for radioactive contaminants in the environment. We are in the process of coordinating such evaluations with DOE.

We stand ready to share our knowledge with DOE. EPA's radiation and research offices are interested in exploring ways to best bring this about and would welcome the opportunity to pursue this matter further.

V. CONCLUSION

In closing, I would like to reiterate that EPA is very serious in its efforts to ensure compliance by Federal facilities, and we will take all actions available to us, including enforcement to improve the environmental status of facilities of the Federal government. Federal facilities have been increasing the effectiveness of their environmental management programs, but further progress is needed if Federal facilities are to meet their obligations to comply with all of the environmental laws.

I do believe that we are making significant progress in reaching agreements with DOE for RCRA and Superfund compliance and future cleanups. Obviously, some large and potentially difficult challenges remain. To overcome them and maintain the momentum we have set into place recently will require additional effort by all partners.

This concludes my prepared statement, Mr. Chairman. My colleagues and I will be happy to answer any questions you may have.

Senator EXON. Thank you very much, Mr. Diamond, and thank you, Mr. Wade. We will go to questions shortly.

I would advise each of you that there may be additional questions for the record by Senators who could not be here because of other commitments this morning. I direct at this time that the record be kept open an appropriate period for any Senators to file any questions that they would like to ask in writing, to be answered in writing in return by the experts that are with us today.

Let me start off the questioning. We will go to a 6-minute round. I ask the staff to please advise me.

First, I would like to go just a little bit afield with a question. We are concerned primarily about high level nuclear waste and that is the main jurisdiction of this committee. We also do get into, from time to time, in serving our constituents, the low level nuclear waste not necessarily of a military nature.

I would like to ask you, Mr. Diamond, do either you or your two associates that are here with you this morning deal also with the EPA problems in low-level nuclear waste of nuclear facilities other than military?

Mr. DIAMOND. Preliminarily, Mr. Chairman, yes. Under Superfund we deal with anything which is a hazardous substance, and that includes radioactive material. It includes mixtures of radioactive and chemical material. It includes chemical. So it is very comprehensive.

Senator EXON. I just wanted to establish that. That is good. Then, since you do, my next question I think would be in order. How, in your opinion, is the compact arrangement working out that was put through the Congress several years ago to allow States to band together into compacts to provide EPA-approved facilities, working in conjunction with the States for low-level nuclear waste? How is that generally going around the country?

Have you been satisfied with it?

Mr. DIAMOND. That, I believe, Mr. Chairman, is not really in the purview of EPA. We deal with, if there were a problem—that is, a release of hazardous substances, including radioactive materials from a Federal facility—that would be covered by Superfund. But the compact process of dealing with low-level waste is not covered by that program.

Senator EXON. So then the three of you do not have any firsthand information or are considered experts on that part of the program; is that correct?

Mr. DIAMOND. I am sorry, Mr. Chairman, that is correct.

Senator EXON. Thank you.

Mr. Diamond, in your prepared testimony you state that the cleanup, and I use your words, "priorities are established within the agreements based on the relative threats to human health and environment as EPA develops these comprehensive agreements with DOE and the States." Given that, what mechanism exists to assure a consistent set of priorities is applied across all of these agreements? Is that a concern?

Mr. DIAMOND. Mr. Chairman, consistency is always a concern, but there is a tension between consistency and the enormous complexity of these facilities. In other words, every facility is unique and therefore the requirements that would be imposed at these facilities are naturally going to be different from one to the other.

We have established within my office dealing with the enforcement of waste programs a Federal facilities hazardous waste compliance office. Mr. Grundler, to my right, is the head of that office. He has a staff who maintains contact, constant contact, with EPA's regional offices. We see and are involved in the negotiation of all of the individual agreements with DOE and other facilities, and we assure that there is a measure of national consistency and that national policies are adhered to.

But, as I say, the individual agreements will vary enormously because the circumstances vary enormously. In addition, the States are major players. State requirements, State priorities, will also have an impact here and will create certain differences one facility to another.

Senator EXON. Mr. Diamond, in the viewpoint of the EPA could more money than requested in the fiscal year 1990 budget be usefully spent on cleanup activities in the view of the Department of Environmental Control?

Mr. DIAMOND. Mr. Chairman, we have canvassed our regional offices. In the opinion of our regional personnel, there are not any situations in which there are immediate risks to public health that are not being dealt with. In addition, we believe that the process of initiating the study and remediation on a long-term basis is having a satisfactory initiation and that would be basically my response to that question.

Senator EXON. Mr. Diamond, the Department of Energy's modernization study states that "as DOE transitions from the study phase into the remedial action phase the annual resource requirement will increase significantly." I think we all agree with that. In other words, some expect the actual cost of the cleanup to be higher than the already astronomical costs identified.

The Environmental Protection Agency has been managing large cleanup programs such as the Superfund that you and I and others have referred to this morning over the last decade so you have had some experience. Are there lessons to be learned from management of other large cleanup projects that could be helpful to the Nation and all of us in managing its cleanup resources as efficiently as possible in this other area?

Mr. DIAMOND. I think, Mr. Chairman, the principal lesson is that the cleanup—and we are dealing with a set of extremely complex sites, that is, a great many of the DOE facilities are some of the most complicated hazardous waste sites in the Nation, and the experience that we have is that you must do very careful and very thorough evaluations both of the nature of the problem and of the available remedies before you will know exactly what is the best set of remedies—usually it is a combination of remedies—and before you will know exactly what the cost is going to be.

Most of the problem at DOE facilities, as indeed most of the problems at Superfund sites nationwide, deal with, or at least the most serious and pervasive problem is contamination of groundwater. Finding out what the problem is, finding out where the contamination is, finding out where it is going and how fast it is going and whether certain components are moving differently or more quickly than other components is proving to be an extraordinarily complicated task.

We have to focus and make sure that those studies are done properly. If those studies are done improperly, then the ultimate delay to the cleanup will be enormous.

Senator EXON. I guess then I interpret your remarks this way. With all of the difficulty and what you have learned with regard to nonnuclear cleanup but highly toxic materials which spurred the Superfund program from the beginning, when we are dealing with nuclear waste we just have to be even more careful and more thorough than you have been so far with the basic Superfund activities. Is that a fair statement?

Mr. DIAMOND. Well, Mr. Chairman, I would say, for example, that the Hanford facility is probably the most complex facility in the Nation, and therefore we are dealing with the most complex end of the spectrum of Superfund sites when we are talking about the DOE weapons complex.

Senator EXON. Thank you. My time is up. Senator Levin.

Senator LEVIN. Thank you, Mr. Chairman.

Mr. Diamond, you have gone through some of the agreements which have been reached, the interagency agreements which have been reached. Can you tell us how many of those have been reached and how many remain to be reached?

Mr. DIAMOND. The Lawrence Livermore agreement is signed.

Senator LEVIN. If you could just give us the numbers. Three have, eight have not?

Mr. GRUNDLER. Three agreements have been reached so far with the Energy Department. I believe we are planning an additional eight or nine agreements for this year that are undergoing negotiations right now. I can give you the precise figure for the record.

[The information follows:]

EPA will enter into an IAG with every DOE facility which is placed on the National Priorities List (NPL). The Agency will usually begin IAG negotiations shortly after the facility is proposed for inclusion on the NPL. EPA plans to enter into IAGs with the following DOE facilities in fiscal year 1989: Lawrence Livermore National Laboratory (completed), Monticello Properties (completed), Hanford Site (completed), Maywood Interim Storage Site, Wayne Interim Storage Site, St. Louis Air Port Authority, Oak Ridge, Savannah River Plant, and Idaho National Engineering Laboratory. In fiscal year 1990, the Agency intends to enter into IAGs with the following DOE facilities: Mound Site, Weldon Springs Quarry, Weldon Springs Ordnance, Rocky Flats Plant, Feed Material Production Center, Lawrence Livermore National Laboratory Site 300, Paducah Gaseous Diffusion Plant, and Brookhaven National Laboratory.

Senator LEVIN. And how many beyond that this year? You said three, approximately, already, and eight or nine more, hopefully, this year?

Mr. GRUNDLER. We are planning on having some kind of agreement either under the Superfund statute or under the RCRA statute for each of the major nuclear weapons facilities, which I believe number 16 or 17, and those we hope to be in place within the next 1½ or 2 years.

Senator LEVIN. So the balance of the ones that are not in place this year would be in place next year?

Mr. GRUNDLER. That is exactly right. We have budgeted a plan for that.

Senator LEVIN. Which of those are the more difficult ones of the ones that have not been reached yet?

Mr. **Grundler**. I would say the Savannah River plant, where we have already started negotiations, as well as the Oak Ridge National Reservation in Tennessee.

Mr. **Diamond**. I would also say Hanford is in a situation in which an agreement—we are on the verge of a complete signed agreement, but we do not quite have it yet.

Senator **Levin**. So two that are not yet in sight that are the most important are Savannah and Oak Ridge?

Mr. **Grundler**. That is correct.

Senator **Levin**. The advisory committee at DOE on nuclear facilities safety, which was under Ahearne's chairmanship, issued a report which was critical of the Department last year, I believe. He has testified, Mr. Ahearne, that the DOE needs a radical change in culture and an infusion of more technical expertise and resources in order to address the problems that we have.

The GAO has also said that they have some doubts as to whether the DOE has sufficient technical expertise to accomplish the tasks ahead. I am wondering whether or not, Mr. Diamond, you would agree with that, those assessments.

Mr. **Diamond**. Well, much of those assessments, Senator, deal with safety issues and that is really outside of our purview. To the extent you are dealing with environmental issues, what we have seen over the last year or two is in many cases a notable improvement in the ability to work together with the Department of Energy to start to deal with these problems.

Senator **Levin**. I think the referrence that Ahearne was making referred to both safety and environmental problems.

Mr. **Diamond**. Well, my remark would still be, Senator, that we do see improvements in a number of areas. We do see a willingness now to sit down and enter into these agreements and to move ahead with the work. EPA will be overseeing the work that is done at these facilities, and we have available to us contractors who can provide expertise in the area of cleanup.

Senator **Levin**. DOE, according to the GAO, is planning new processing plants which are going to be creating more waste, obviously, on a faster track than environmental cleanup and decontamination. Is that true? Are we going to be creating more waste faster than we are cleaning up existing waste?

Mr. **Diamond**. Well, new facilities must have a RCRA permit, so new facilities will have to have permits to assure that they are properly handling the waste they generate.

Senator **Levin**. Putting aside whether or not it is being properly handled, are we going to be creating more waste, properly handled or otherwise, faster than we are going to be disposing of existing waste?

Mr. **Diamond**. I really do not know the mass balance on that, Senator.

Senator **Levin**. Secretary Watkins at one point said that he opposes reopening any facilities until the Department can bury more waste than we are producing. Was that an accurate quote, do you know, Mr. Wade?

Mr. **Wade**. I am not sure of the accuracy, Senator Levin, in terms of actual volume of waste buried versus what is produced. The Secretary's point was that before any facility that is currently shut down—and he was specifically referring to the Savannah River reactors—before they are reopened not only must he be assured that they can safely be operated he must also be assured that the waste streams that come from the operation of those facilities are being properly handled.

Senator **Levin**. But is this the Department position or not?

Mr. **Wade**. Yes.

Senator **Levin**. Not what you just said. What I am quoting the Secretary.

Mr. **Wade**. That is correct.

Senator **Levin**. That we can "bury more waste than we are producing," that is the Department position?

Mr. **Wade**. I must say, Senator, I am not quite sure of the context in which that statement is made. Let me check that and we will get back to you for the record on precisely what his position is.

[The information follows:]

The referenced quotation is not entirely accurate. In response to a question from Senator Johnston during his confirmation hearing Admiral Watkins said:

"We cannot start-up in my opinion until we are addressing these things in a very forthright way so people do feel that we have our arms around this and it's under some kind of positive control . . . It is not under that positive control today. Witness no specific waste management programs at any site that clearly sets near term objectives that we can fund and accomplish those objectives so that everybody can see that we're making movement. That is, we're burying more than we're producing. We haven't achieved that yet."

Admiral Watkins has stated, and it is the Department's position, that no facility will be started until it can be operated safely. The Admiral's statement at this hearing underscores his commitment to address waste issues before starting up the Savannah River Site reactors. Immediately after his confirmation, the Admiral directed the preparation of a 5-year plan to set priorities in the cleanup of Department facilities. This 5-year plan will address the management of all stored and generated wastes and is in addition to existing Department programs that annually assess the adequacy of existing waste treatment and disposal capacity.

Senator **Levin**. All right. Does the EPA want to have litigation authority against the DOE?

Mr. **Diamond**. Senator, we are making what we think is some real progress in entering into these agreements with DOE facilities. Those agreements are fully enforceable by States and by citizens. They even include stipulated penalty provisions. Our experience so far is that DOE is carrying out those agreements.

Senator **Levin**. Could you answer my question?

Mr. **Diamond**. There has been legislation that has been introduced in the House. There is not a formal EPA position on that.

Senator **Levin**. Would you get back to us on that?

Mr. **Diamond**. Yes.

[The information follows:]

U.S. Environmental Protection Agency,
Office of Solid Waste and Emergency Response,
Washington, DC, June 13, 1989.

Hon. Richard G. Darman,
Executive Office of the President,
Office of Management and Budget, Washington, DC.

Dear Dick: The purpose of this letter is to express the views of the Environmental Protection Agency (EPA) on an amendment in the nature of a substitute to H.R. 1056, introduced by Congressman Schaefer and adopted by the House Subcommittee on Transportation and Hazardous Materials on May 23, 1989. The amendment concerns use of enforcement action by EPA against other Federal entities.

EPA supports the bill as adopted by the subcommittee, and recommends that the administration endorse the legislation. H.R. 1056, as amended, contains many useful provisions which we believe will improve Federal facilities' compliance with the Resource Conservation and Recovery Act (RCRA). The amended bill also addresses all of the concerns expressed by EPA in testimony before the subcommittee on April 12, 1989.

In the course of administration discussions concerning H.R. 1056, several federal Departments expressed concerns about establishing national environmental and funding priorities for the cleanup of Federal establishing priorities for major cleanups which will occur at Federal facilities in the coming years. In this regard, EPA is proposing to convene a conference later this summer with Federal agencies and state representatives to begin discussing this problem and a process for developing practical solutions. Following these meetings, the Agency will assess the need for any additional steps concerning cleanup priorities.

Sincerely yours,

WILLIAM K. REILLY.

Senator LEVIN. Thank you, Mr. Chairman.

Mr. EXON. Thank you very much, Senator Levin.

Senator Warner.

Senator WARNER. Thank you very much, Mr. Chairman. This is indeed an important and timely hearing and I congratulate you on arranging it.

Nice to see you again, Mr. Wade. It has been a number of years. How many years have we sat across the table from one another?

Mr. WADE. A decade, Senator Warner.

Senator WARNER. That is what I thought.

Senator LEVIN. You brought that on yourself, you know, John.

Senator WARNER. That is true.

Secretary Watkins seems to believe the cost of environmental cleanup, Mr. Wade, may be overstated because they do not reflect the application of new technology to the cleanup challenge. In your judgment is there likely to be a high payoff from investment in research and development related to the cleanup job?

Mr. WADE. I think the answer to that is very clearly yes, Senator Warner. I think that while we have already demonstrated in a fragmentary sort of way that careful application of technology really pays off in waste remediation, we have not done it in a fashion that is institutionalized, and that is what Secretary Watkins has directed that we now do.

I think that clearly will pay off.

Senator WARNER. Mr. Diamond, as a matter of fact I just left your agency this morning. We had a meeting looking at the problems of growth in your agency and the inability to house the functions of EPA. Do you agree that it is time to get a new place from which to operate down there?

Mr. DIAMOND. Facilities management is not my specialty, Senator.

Senator WARNER. But you suffer from a lack thereof, do you not?

Mr. DIAMOND. It is an unpleasant building.

Senator WARNER. What has been the experience of EPA in applying new technology to the cleanup challenge?

Mr. DIAMOND. We have a number of efforts under way to evalute new technology. It has been a slow process, I think would be a fair statement, up to this point. But we are putting some effort through our SITE program (Superfund Innovative Technology Evaluation) which is a program in which we devote resources—now this is not necessarily just Federal facilities; these are any—to evaluating new technologies. And we believe that there are some real payoffs to be made for looking at new technologies for cleanup.

I think that is particularly important for radioactive releases, but it is true across the board.

Senator WARNER. Has investment in cleanup-related research paid large dividends, in your judgment?

Mr. DIAMOND. I am not sure I can give you a definitive answer yet on that, but we believe it will. We are certainly hopeful it will.

Senator WARNER. Mr. Wade, returning to you, what will be the relationship between your respective organizations and the special assistant for coordination of DOE defense waste management recently announced by Secretary Watkins?

Mr. WADE. Mr. Leo Duffy, who is the individual that the Secretary has appointed as his special assistant, has direct responsibility to the Secretary for the development of these 5-year cleanup plans. The process by which those plans are developed is the responsibility of my organization, and so I therefore am working very closely with Mr. Duffy. He is overseeing everything that we are developing in my area and further is performing the same function for all of the waste areas in the Department, not just limited to defense waste.

Senator WARNER. Mr. Chairman, the balance of my questions I would like to have inserted in the record. I thank the chairman.

Senator EXON. Thank you very much, Senator Warner.

Senator Wirth.

Senator WIRTH. Thank you very much, Mr. Chairman.

I am very pleased that all of you are here this morning. I am sorry I was not here for your opening statements, but we have reviewed them.

I must say, Mr. Chairman, I was surprised at the statements made that you feel that the budgets are adequate and that no more money at this time can be effectively spent. That is the thrust of what you all were saying from EPA, as well as what you were saying, Troy; is that correct?

Mr. WADE. Yes. We have said, Senator Wirth, that at the moment we believe that the fiscal year 1990 budget is adequate. It well may be as these 5-year plans are developed that we may wish to make adjustments within the overall budget line.

Senator WIRTH. You are trying to effectively duck the issue this year and maybe over 5 years we will jam some in, but we are not going to do it this year. That is essentially what the budget says, is that not correct? Your smile says yes.

Mr. Diamond.

Mr. DIAMOND. Senator, I want to be very clear and candid with you. We have not done a complete analysis of the DOE budget. I am not in a position to tell you, to give you an evaluation of another agency's budget. What I said was our regional offices are not finding any immediate health risks which are not being addressed, and we are finding a satisfactory initiation of studies where those are needed at a number of facilities.

Senator WIRTH. Let me just then cite a little data that I do not think runs parallel to that. Last August the EPA and the Colorado Health Department—and, as you can understand, I am concerned about Rocky Flats, which you all have at the top, everybody seems to have at the the top of every list of facilities that have significant problems—last August your agency, EPA, and the Colorado Department of Health rejected the Department of Energy's plan for cleaning up contamination at Rocky Flats.

You stated that portions of the plan were "indefensible," subjective, and were based on "inappropriate and unjustified interpretation of pollution readings." You said that they had to go back and resubmit a new, revised plan. This is 7 months ago. Now they have not had the money to do so. Seven months have gone by. No revised plan has come forward for lack of funding.

Now, how do I explain to the people who live around Rocky Flats that on the one hand you said that the report done by EPA was not adequate and that was 7 months ago, and then 7 months later, because of lack of money, they have not been able to come up with a plan and yet you say there is plenty of money to do the job?

Does that all square? Would you like to go back and take a look at that?

Mr. GRUNDLER. Senator, we were not aware that the lack of plan or revision to that plan was due to lack of funding. We obviously have got some technical disagreements with the Rocky Flats plant over the adequacy of their studies and we are working through them. In fact, there was a meeting several weeks ago. But I was not aware of the fact that the plan had not been forthcoming or a response to our comments had not been forthcoming due to lack of funding.

But we will certainly look into that.

Senator WIRTH. Great. If you would, I would appreciate it.

Let me try another one. Are there no cleanup projects that ought to be accelerated at this point? For example, at Rocky Flats we have some very significant problems, and have had for a long period of time, with the solar evaporating ponds that are there. Everybody agrees those have to be cleaned up.

Now I do not think anybody says that there is funding, however, to go clean them up. Now people in the area are concerned about how we are going to get those cleaned up. The answer is, well, there is no money to do it. But now you are coming in and telling us that there is plenty of money in the budget to cover all of the things that ought to be done.

Now how do we square that one at Rocky Flats? The thrust of all of this is to suggest I do not think it is the case that you cannot spend any money out there. I think this is part of the overall budget dodge.

Do you know anything about, for example, the solar evaporating pond issue?

Mr. GRUNDLER. I do not know what the schedule is.

[The information follows:]

The cleanup of the Solar Evaporation ponds is being regulated under the RCRA statute. As required by RCRA, DOE has submitted draft Closure and Post-Closure Care Plans for the Solar Evaporation Ponds three times. In each instance, the Colorado Department of Health and/or EPA identified deficiencies in the plan. For this reason, the State of Colorado is now preparing the draft Closure Plan which will be submitted for public review. The timing of the State of Colorado's draft Closure Plan is not within EPA's direct control. We do expect, however, that the State of Colorado will finalize the Closure Plan by the end of fiscal year 1989.

Senator **Wirth**. Do you know anything about other projects that might be accelerated in terms of cleanup at Rocky Flats, which by your own data and that of DOE is one of the high priority facilities to be cleaned-up?

Mr. **Grundler**. As Mr. Diamond said, we have canvassed our regions and we are gathering information on their best judgment as to what things can be done sooner or faster, and we would like to submit those for the record.

Senator **Wirth**. If you would do that, that would be helpful. You know, you Region VIII at EPA has told—we have understood from Region VIII at EPA that the budgets for oversight by EPA and the Colorado Department of Health are woefully inadequate. That is the information that we have gotten from them. Clearly your information suggests something to the contrary, does it not, Mr. Diamond?

You are suggesting you have plenty of funding or as much funding as you can use.

Mr. **Diamond**. If you are talking about EPA's budget, we are increasing for fiscal year 1990, will be increasing the resources available for all Federal facilities' compliance efforts, and a lot of that I suspect will be utilized at Department of Energy facilities.

Senator **Wirth**. Do EPA and the Colorado Department of Health currently have the resources that they need to monitor what the Department of Energy is doing?

Mr. **Diamond**. I think I would like to get back to you on that.

[The information follows:]

EPA has budgeted resources for oversight of Federal Agency CERCLA and RCRA response actions as described in the previous question. These resources appear to be adequate for EPA's work at the Rocky Flats Plant.

The Agency is not certain of the current status of state oversight resources. However, EPA is confident that the state will be reimbursed by the DOE for its oversight resources when a three-party IAG is negotiated. The Agency expects such an IAG will be executed this fall.

Senator **Wirth**. If you would, it would be helpful. Again, I am not trying to beat up on you, Mr. Diamond. You or the new administration coming in is inheriting this wonderful Christmas package that has been left by inattention for a long time. Senator Exon and Senator Glenn and I and others have been pushing on this and gotten no response and we are delighted that you are here getting us some response, finally.

But the sense of urgency is certainly not reflected, I do not think, in the budget.

Mr. **Grundler**. Senator, if I could just follow along with EPA's budget, Region VIII is getting a significant increase next year for their Federal facilities work, and that can be devoted to Rocky Flats as well as other Federal facilities.

Senator **Wirth**. Let me raise one final point in the final minutes remaining to me. You know, Rocky Flats sits upstream of a community named Broomfield. There are a lot of people who live in Broomfield, downstream from Rocky Flats. It sits up here, Great Western Reservoir, and then Broomfield.

Some 12 years ago, because of potential contamination problems of the Great Western Reservoir, we got some funding from DOE and as an emergency basis got Broomfield tied into the City of Denver's water supply so that were there problems of water washing in, pollution washing in from Rocky Flats into the reservoir which supplies Broomfield, Broomfield would have an alternative water supply.

It was a good step to take. Now we just recently had a major overflow coming from Rocky Flats in terms, as I understand it, of some major acids flowing out of Rocky Flats. You know, Rocky Flats wants to get rid of that by draining these acids down the creek that runs into Great Western Reservoir and then flushing it on out.

There is no diversion project in this whole process. We are still where we were some time ago, so that anything that comes out of Rocky Flats still goes through Great Western Reservoir right into the drinking supplies of people from Broomfield. And one of the items that we had hoped to do was to get funding for a diversion project so that we could assure the safety of Great Western Reservoir and the water supplies for Broomfield.

Maybe you could check that out as well. Could you do that? I do not know whose jurisdiction that falls under, if that is DOE or if that is the EPA. Who would have that responsibility?

Mr. DIAMOND. In any event, we will he happy to find out who knows and get the information.

Senator WIRTH. That would be great.

[The information follows:]

EPA has not taken a position on the proposal of the City of Broomfield for DOE to build a diversion channel for the effluent from the Rocky Flats Plant which currently discharges into Walnut Creek which discharges into the Great Western Reservoir, which is the municipal water supply. In June, 1989, EPA will be reconsidering the National Pollutant Discharge Elimination System (NPDES) permit which regulates such discharge. If it can be shown that the RFP discharge into the municipal water supply presents a health threat, EPA will stipulate conditions in the NPDES permit which will prevent such threats. One such condition could be construction of a diversion channel.

Mr. WADE. Could I make a comment, Senator? There was a chromium release 2 or 3 weeks ago into pond 505, I believe it is, which is one of the ponds above the Great Western Reservoir. There is a meeting going on today between the Rocky Flats people and the city of Broomfield to discuss, even though the chromium levels in that pond are at EPA drinking water standards, what actions we collectively want to take with the city of Broomfield having to deal with the possibility of a flood from a very heavy rainstorm.

I think that there is not an immediate hazard to health from this problem. It does point out the fact that we need to get on with some sort of a diversion plan below Great Western Reservoir.

Senator WIRTH. Broomfield just on that front has told us that the Department of Energy would like to empty that contaminated water from the chromic acid accident into Walnut Creek, which in turn feeds into the reservoir and that the Broomfield officials are, as you know, very much opposed to that action.

Mr. WADE. And that is the discussion that is going on right now about what is the best action to take.

Senator WIRTH. Well, that is where the whole notion of a diversion project becomes so important. Mr. Wade, we appreciate all the good work you have done over the years. You have been, as I have said on previous occasions, one of the shining lights in this area.

You are at least very forthcoming and being very honest about the set of problems that we face. And I, for one, want to on behalf of my constituents echo my appreciation for the honesty and forthrightness with which you have faced some very difficult issues.

Thank you very much. I appreciate it. Thank you, Mr. Diamond. We look forward to hearing from you. Thank you, Mr. Chairman.

Senator EXON. Thank you, Senator Wirth.

Mr. Diamond, I want to go back to a question I asked you earlier about other possible uses if additional money could be provided. You indicated that your best judgment was that additional funds were not necessary.

In preparation for this hearing we asked the Department and others to give us at this hearing your ideas on the question that I just asked. In your prepared testimony and in answer to my question you have indicated that you did not think additional money was necessary. We had heard, and I am wondering if it is true, that when you made inquiry to your regions after we posed this question to you that some of your regions came back with additional cleanup projects that they thought would be in order but were not funded.

Is this true or is this misinformation that has been reported to us in the form of "rumor" as of now?

Mr. DIAMOND. Mr. Chairman, I want to repeat something, which is that I do not want to give the impression that we have engaged in a thorough analysis of the DOE budget and have some form of role of oversight or approval of that budget. What I did say is that the regions are not reporting to us any immediate public health threats that are not being addressed, and we are seeing a good initiation of studies that need to be done.

If there is additional information that we can obtain concerning immediate measures that can be taken or interim measures that can be taken, we will supply them to the record. We will go back out to our regional offices and we will ask that question.

[The information follows:]

Question 1. What interim response actions or focus studies resulting in interim response actions can be conducted in the next 2 years that would correct urgent problems of environmental contamination at DOE defense nuclear facilities?

Answer. Because the level of Agency involvement differs at this time from facility to facility, EPA's knowledge of what actions are required varies. EPA canvassed its Regional offices and their responses are summarized below. Please note that where cost estimates are provided, they do not represent "budget quality" figures. Moreover, these responses are EPA's suggestions based on information which our Regions currently have available. The Agency understands that DOE is currently developing a 5-year plan which identifies and prioritizes cleanup needs DOE-wide. These responses are not meant to undermine that effort by DOE. EPA looks forward to working with DOE on developing this plan and reviewing any additional information which may be relevant in formulating cleanup priorities. Because these questions focus on DOE defense facilities, Regions 1, 2, and 3 have no response because there are no DOE defense nuclear facilities within their geographical area.

REGION 4

General Response

In Region 4, DOE Savannah River Plant (SRP) and DOE Oak Ridge have RCRA Corrective Action permits and the Corrective Action permit for DOE Pinellas is drafted and will be issued in the next few months. These permits require the facilities to conduct RCRA Facility Investigations (RFIs) to determine the extent and impact of releases from solid waste management units (SWMUs), to conduct interim measures where appropriate, and to develop corrective measures plans as necessary. These RFIs could be considered focused studies to determine what urgent problems exist and what interim, remedial and/or preventative measures are necessary to be conducted on an accelerated basis within technical and budget constraints.

The Region intends to exercise CERCLA authority Section 120 to supplement RCRA authorities already in place. This is required because RCRA lacks the jurisdiction to address radiological releases.

Oak Ridge Reservation

The interim response actions that should be conducted in the next 2 years that would correct urgent known problems in fiscal year 1990 include:

1. Continue the RCRA closure activities of the Oak Ridge Gaseous Diffusion Plant (K-25) ponds K-1407-B&C.
2. Continue the closures of the Weapons Plant (Y-12) land based units. (There are eight RCRA land units in various states of closure and post-closure activity.)
3. At X-10, the Region expects DOE to perform interim measures for the mixed low-level waste storage tanks under the Interagency Agreement currently being negotiated.
4. At Y-12, the Region expects DOE to take measures to expedite the remediation of East Fork Poplar Creek which was contaminated by the off-site mercury release from Y-12.
5. At X-10, begin RCRA closure activities at the Solid Waste Storage Area 6, a 10-acre mixed waste landfill located with evidence of groundwater contamination.
6. At X-10, begin Hydroactive Facility plugging and Abandonment activities.

For fiscal year 1991, activities should include:

1. Corrective action at the East Fork Poplar Creek.
2. RCRA Section 3004(u) and CERCLA Section 120 corrective activities at the Y-12 plant.
3. RCRA treatment and storage facility closures at X-10, Y-12, and K-25.
4. Completion of twenty percent of the closure activities required at Solid Waste Storage Area 6 at X-10.
5. RCRA Corrective Action at K-25.

U.S. DOE Savannah River Plant (SRP)

Due to the size of SRP and the location of most of the waste management units on the reservation, the Agency considers only one area presenting an urgent environmental problem at this time. This is the chlorocarbon contamination in the A/M area, for which SRP has already begun corrective action for groundwater contamination pursuant to the RCRA permit. Additional withdrawal wells need to be installed and/or other activities (e.g. soil gas extraction) need to be undertaken to halt the spread of this contamination. The Region estimates that at least a 10-fold increase in the number of withdrawal wells and the withdrawal rate is required.

Over the next two to three years, thirty-seven RCRA Facility Investigations will be started at SRP under the RCRA permit. These studies have been prioritized and an accelerated schedule required under the RCRA permit for the sites containing chemical wastes and mixtures of chemical wastes/radioactive wastes has been developed. The primary goal of these RFIs is to study and/or identify any other urgent problems that may exist at SRP.

Pinellas Plant

It is unknown whether urgent environmental problems exist at the Pinellas Facility to date.

REGION 5

Portsmouth Uranium Enrichment Complex

Currently EPA and DOE are negotiating an Agreement which will require DOE to perform a RCRA Facility Investigation and remediation of on-site and off-site contamination at the facility. This Agreement further requires the completion of interim measures within the next two years to address known contamination from RCRA regulated units, PCB releases, and the installation of a network of groundwater interceptor wells if evidence of off-site groundwater contamination is discovered.

Mound Plant

Currently DOE has five programs under way to study or clean up portions of the Mound Plant. EPA is encouraging cleanup at discrete operable units at the facility.

One such operable unit is located off-site. This is the abandoned Miami-Erie Canal beds which are contaminated primarily by plutonium. Additionally, there are two other areas of concern for potential off-site migration of contaminants. These two areas are: (1) seeps from the hill on which the Mound Plant is located; and (2) general groundwater migration off-site (perhaps influenced by Mound production wells and municipal wells for the city of Miamisburg).

Feed Materials Production Center (Fernald)

Interim response actions that could be conducted in the next 2 years include the collection and removal of grossly contaminated water found under production buildings, collection of contaminated groundwater that is contributing to the off-site contamination plume, removal of contaminated sediments from Paddy's Run that are contributing to the off-site contamination plume, and removal of waste from the K/65 Silo.

REGION 6—SANDIA NATIONAL LABORATORIES

It is unknown whether urgent environmental problems exist at this facility to date.

Los Alamos National Laboratories

It is unknown whether urgent environmental problems exist at this facility to date.

DOE Pantex

DOE will be conducting RCRA Facility Investigations at approximately 26 units that have a high potential for migration and subsequent human exposure. Moreover, there are two units with known plumes of contamination. A Corrective Measures Study on these two units is scheduled for completion by mid-1989. The Region anticipates that pumping and treating groundwater will be required.

REGION 7

DOE Kansas City Plant

EPA believes that the Kansas City facility needs to place additional emphasis on their groundwater remedial activities and corrective action work. The agency hopes to accomplish this through its negotiations of a RCRA section 3008(h) Order. Moreover, DOE needs to increase its emphasis on conducting interim measures to remove and treat contaminated groundwater. Finally, DOE needs to take a more aggressive approach in assessing and evaluating groundwater data generated as it relates to removing groundwater containing hazardous waste and hazardous constituents. Such an emphasis on contaminated groundwater and installation of additional pumping wells would mitigate the hazardous waste and hazardous constituents from migrating off of the facility and entering local streams.

REGION 8

DOE Rocky Flats

EPA believes that the following Interim Response Actions and studies need to be conducted at Rocky Flats over the next two years:

1. Extensive background studies to help determine "how clean is clean;"
2. Interim Remedial Action for Hillside 881;
3. Sampling and Remedial Investigation Workplans for 903, E. Trenches, and Mound high priority sites; and
4. Health/Risk Assessment for the solar evaporation surface impoundments.

REGION 9

Lawrence Livermore National Laboratory (LLNL)

LLNL has been very active in addressing its environmental problems and concerns. DOE has placed over 200 monitoring wells to date and is continuously collecting data from geologic and geophysical logging, soil and water sampling, and hydraulic testing in conjunction with performing records searches to determine the extent and possible sources of VOCs and other compounds in the groundwater beneath LLNL. These actions help in determining what corrective actions, if any, will be most environmentally and economically effective.

LLNL has begun a pilot study to pump and treat its main plume of contamination. This study will use three ultra-violet light/hydrogen peroxide treatment facilities to break down the VOC-contaminated groundwater and then discharge the product (clean water) into recharge ponds. This study is large enough that it may, if effective on the contaminants, constitute an interim response action that could then be expanded into corrective action.

DOE is also engaged in an on-going underground storage tank program. This includes the testing of tanks and the complete restoration of tanks detected to be leaking. These actions serve as preventative, cost effective maintenance when viewed with the alternative of having to deal with expensive corrective action in the future.

At this time, Region 9 has no involvement with the LLNL Site 300, the Sandia National Laboratory, and the DOE Nevada Test Site. It is thus unable to provide information on specific activities needed at these sites.

REGION 10

Hanford

While the Agency has considered the use of Interim Response Actions (IRAs), at this time it has not identified any situations at Hanford which pose an immediate threat to human health, thereby warranting an IRA process. The contamination is generally wide-spread within the Hanford Site boundary and cleanup priorities have been set to address those areas which present the greatest long-term threat to human health and the environment.

Idaho National Engineering Lab

The area known as the "Test Area North" created contamination in a drinking water well in excess of the acceptable drinking water standards. As a result, the well was shut-down. Pursuant to the Interagency Agreement with EPA, DOE has provided an alternate water supply and developed a treatment system (sparging system) to treat the drinking water to acceptable drinking water standards.

Additionally, DOE is in the process of characterizing the groundwater system through the Remedial Investigation process set forth in the Interagency Agreement. Data collected during the Remedial Investigation will provide the basis for determining whether additional interim actions are appropriate.

Question 2. What interim response actions or focus studies resulting in interim response actions can be conducted in the next 2 years to accelerate environmental restoration of problems for which corrective actions can be readily identified?

Answer. The Agency will again address this question Region by Region with the exception of Regions 1 through 3 which do not have any DOE Defense facilities.

REGION 4

Oak Ridge

No projects can be accelerated in fiscal year 1990 beyond the existing schedules. However, funding for projects currently budgeted is crucial to avoid delays of planned environmental restorations. Beyond the RCRA Facility Investigation (RFI) /Remedial Investigation (RI) studies currently scheduled for fiscal year 1990 and fiscal year 1991 the following activities should be conducted in fiscal year 1991 to accelerate environmental restoration of existing problems:

1. Develop low-level mixed waste disposal facilities at Y–12;
2. Perform corrective action activities at Bear Creek Valley located at Y–12;
3. X–10 Solid Waste Storage Area 6 (i.e. conceptual designs and technology demonstrations such as grouting, in-situ vitrification);
4. Interim response actions for the low-level mixed waste tanks (i.e. sub-surface investigations, waste removal, etc.);
5. Undersignated interim response actions at X–10;
6. Remedial action for the low-level mixed waste tanks (i.e. sub-surface investigations, waste removal, etc.);
7. Hydroactive plugging and abandonment of wells; and
8. RCRA Facility Investigations and Remedial Investigations on lower priority solid waste management units at X–10.

Savannah River Plant

The Region believes a proper 2-year goal would be for DOE to complete closure, whether by source removal or capping, of the RCRA regulated units and interim response actions/measures on the eighteen (18) SWMUs with known releases. This is an activity that can be accomplished in a relatively short period of time and would accelerate environmental restoration.

Another Interim Response activity that the Region deems will accelerate environmental restoration concerns the F and H-Seepage Basins where shallow groundwater contaminated with heavy metals and radionuclides is discharging to surface waters. DOE should install interception trenches and/or shallow withdrawal wells that will intercept contamination before it gets to Four Mile Creek. If this interim response is taken now, it may simplify or preclude the need for later cleanup of the Creek itself.

Pinellas Plant

The RCRA Facility Investigations to be conducted under the RCRA permit are intended to accelerate, as needed, environmental restoration of problems for which corrective action measures can readily be identified. The off-site contaminated area cleanup should continue as a priority project.

REGION 5

Portsmouth Uranium Enrichment Complex

Currently EPA and DOE are negotiating an Agreement which requires interim measures to be completed within specific time frames upon signature of the Agreement. DOE is aware of the interim measure requirements. Submittal of the interim measure reports and adherence to the schedule contained in the Agreement will ensure timely action on the facility's environmental restoration program.

Mound Plant

DOE has a scheduled program called Decontamination and Demolition (D&D) for cleanup of radioactive structures. This program is scheduled over a long time frame and could be shortened without loss of control or effectiveness. The radioactive soil contamination has been addressed in an ad hoc manner at Mound, and the time delay could be shortened by incorporating the soil and debris cleanup along with the cleanup of structures.

Feed Materials Production Center

Interim response actions that could be conducted in the next 2 years include the collection and removal of grossly contaminated water caught under production buildings, collection of contaminated groundwater that is contributing to the off-site contamination plume, removal of contaminated sediments from Paddy's Run that are contributing to the off-site contamination plume, and removal of waste from the K-65 Silo. These activities could accelerate environmental restoration.

REGION 6

Sandia National Laboratories

Focus studies that could be conducted in the next 2 years which could accelerate environmental restoration include the installation of eight groundwater monitoring wells, six unsaturated zone wells, the collecting of additional disposal information, and taking groundwater samples. The Region does not anticipate performing interim measures at this time.

Los Alamos National Laboratories

Focus studies that could be conducted in the next 2 years include a Gamma Spectrometer Areal Reconnaissance. The Region believes that the following interim measures to accelerate environmental restoration of problems for which corrective actions can be readily identified: the installation of fifteen new groundwater monitoring wells and analytical work, the installation of twenty exploratory borings, the installation of sediment traps, the plugging of four wells, and the installation of forty vadose monitoring wells.

DOE Pantex Plant

Approximately 27 units with a high to medium potential for releases which are not expected to present an imminent threat require a focused study, e.g. a RCRA Facility Investigation. No Interim Measures are projected for these units for the next 2 years.

REGION 7

DOE Kansas City Plant

DOE should optimize pumping rates on existing wells and maximize operation of existing wells to remove hazardous constituents. DOE should install additional pumping wells to remove hazardous wastes and constituents for the groundwater.

REGION 8

Rocky Flats Plant

See answer to question #1.

REGION 9

Lawrence Livermore National Laboratory

[The Region's response to this question is the same as that for question #1 (*see* page 5).] LLNL has been very active in addressing its environmental problems and concerns. DOE has placed over 200 monitoring wells to date and is continuously collecting data from geologic and geophysical logging, soil and water sampling, and hydraulic testing in conjunction with performing records searches to determine the extent and possible sources of VOCs and other compounds in the groundwater beneath LLNL. These actions help in determining what corrective actions, if any, will be most environmentally and economically effective.

LLNL has begun a pilot study to pump and treat its main plume of contamination. This study will use three ultra-violet light/hydrogen peroxide treatment facilities to break down the VOC-contaminated groundwater and then discharge the product (clean water) into recharge ponds. This study is large enough that it may, if effective on the contaminants, constitute an interim response action that could then be expanded into corrective action.

DOE is also engaged in an on-going underground storage tank program. This includes the testing of tanks and the complete restoration of tanks detected to be leaking. These actions serve as preventative, cost effective maintenance when viewed with the alternative of having to deal with expensive corrective action in the future.

At this time. Region 9 has no involvement with the LLNL Site 300, the Sandia National Laboratory, and the DOE Nevada Test Site. It is thus unable to provide information on specific activities needed at these sites.

REGION 10

Hanford

The Agency and DOE have performed a prioritization at the Hanford facility by using available information and data for each operable unit. The investigation process for all 78 units is scheduled for completion over the next 16 years. The current schedule requires investigation of the highest priority operable units in the near term. Although modifying the schedule to incorporate Interim Response Actions can be done, it would be done at the expense of priority operable unit investigations which have already been scheduled with respect to both time and dollars.

Idaho National Engineering Lab

Carbon tetrachloride from the Radioactive Waste Management Complex has been identified as a source of contamination of surface and groundwater. A pilot scale vapor extraction system is scheduled for development this year pursuant to the Interagency Agreement.

Question 3. What interim response actions or focus studies resulting in interim response actions can be conducted in the next 2 years to reduce future costs of environmental restoration?

Answer. Region 4.

Oak Ridge Reservation

Development of low-level mixed waste disposal sites at Y-12 are needed since there are no sites available that can take the waste that will be generated by many of the interim and long term remedial/corrective actions at Oak Ridge Reservation. This is a critical need that could delay or hinder remedial activities.

Savannah River Plant

Increasing the priority of the RCRA Facility Investigation/Remedial Investigation is recommended on the Old Radioactive Waste Burial Ground. This is a seventy-six acre landfill in which 20,000 pounds of mercury and unknown quantities of other hazardous materials have been disposed. It has been out of service since 1973 and has been capped. Although this landfill poses no urgent threat at present we believe it could pose serious problems in the future. Therefore, ensuring the funding for the RFT/RI in the next 2 years could reduce the potential for serious problems in the future and reduce the future cost of environmental restoration.

Pinellas Plant

The RFIs to be conducted under the RCRA Corrective Action permit should be conducted in the next 2 years to identify what action may be needed to reduce future cleanup costs.

REGION 5

Portsmouth Uranium Enrichment Complex

The Agreement that EPA and DOE are negotiating divides the facility into four quadrants. This division was designed to make site investigations more manageable and to expedite cleanup by two years as compared to a typical site-wide investigation and cleanup approach. The Agreement has a very realistic schedule designed to achieve environmental restoration as quickly as possible. Timely implementation of the activities required by the Agreement will reduce future costs of environmental restoration.

Mound Plant

Timely implementation of the CERCLA Section 120 Interagency Agreement which EPA is currently negotiating with DOE may result in reducing overall costs by identifying necessary Interim Response Actions. Implementation of these actions and acceleration of the environmental restoration for the entire site will result in more cost effective remedies.

Feed Materials Production Center

Interim response actions that can be conducted in the next 2 years to reduce future costs of environmental restoration would primarily include control of current contamination sources and prevention of further off-site migration of contamination. These activities may include those stated in response to questions #1 and #2 above (*see*, page 3 and page 7, respectively), along with air pollution controls on all emission sources, reduction of the on-site drum inventory, storage of drums inside of buildings, reduction of contaminants that are released to the Great Miami River through the effluent line, curtailing the use production equipment and practices that contribute to contamination under production buildings, and ending construction of additional buildings in the production area until the extent of contamination is determined.

REGION 6

Sandia National Laboratories

The Region does not expect that any interim response actions can be conducted in the next 2 years to reduce future costs of environmental restoration, but it does recommend certain focus studies to be conducted to accomplish this goal of reducing future costs. For instance, DOE should investigate the approximately 60 land disposal units during fiscal years 1990 and 1991. This will be done in conjunction with the RCRA Facility Investigation portion of the Hazardous and Solid Waste Amendments permit. This also includes soil sampling and other unsaturated zone sampling.

Los Alamos National Laboratories

The Region deems that a RCRA Facility Investigation of the approximately 60 units required under the current permit in addition to the closure of six RCRA landfills should reduce the future costs of environmental restoration.

DOE Pantex Plant

DOE needs to study over thirty units with medium to low potential for contamination. Some of these units can be deleted during the initial phases of the RCRA Facility Investigation. The Region does not anticipate that Interim measures for these units will be required during the next 2 years.

REGION 7

Kansas City Plant

If the ultra-violet/zone/hydrogen peroxide system is adequate technically, optimization of this treatment system currently operating at less than capacity should be an environmental priority. This should reduce the future costs of environmental restoration of problems for which corrective actions can be readily identified. This would allow additional groundwater to be treated at this plant with volatile organics destroyed rather than being released to the atmosphere. In addition, this facility needs to optimize its groundwater recovery system by optimizing the location and installation of groundwater recovery wells.

REGION 8

Rocky Flats Plant

Interim Remedial Actions and/or focused studies which would reduce the costs of environmental restoration include those mentioned above in Region 8's response to question #1 (*see*, page 4).

REGION 9

Lawrence Livermore National Laboratory

(Again, the Region's response to this question tracks the fund in its response to questions #1 and #2 found on pages 5 and 10 respectively.) LLNL has been very active in addressing its environmental problems and concerns. DOE has placed over 200 monitoring wells to date and is continuously collecting data from geologic and geophysical logging, soil and water sampling, and hydraulic testing in conjunction with performing records searches to determine the extent and possible sources of VOCs and other compounds in the groundwater beneath LLNL. These actions help in determining what corrective action, if any, will be most environmentally and economically effective.

LLNL has begun a pilot study to pump and treat its main plume of contamination. This study will use three ultra-violet light/hydrogen peroxide treatment facilities to break down the VOC-contaminated groundwater and then discharge the product (clean water) into recharge ponds. This study is large enough that it may, if effective on the contaminants, constitute an interim response action that could then be expanded into corrective action.

DOE is also engaged in an on-going underground storage tank program. This includes the testing of tanks and the complete restoration of tanks detected to be leaking. These actions serve as preventative, cost effective maintenance when viewed with the alternative of having to deal with expensive corrective action in the future.

At this time, Region 9 has no involvement with the LLNL Site 300, the Sandia National Laboratory, and the DOE Nevada Test Site. It is thus unable to provide information on specific activities needed at these sites.

REGION 10

Hanford Site

For the Hanford Site, a detailed process has been established for setting enforceable commitments for DOE. The major commitments are referred to as major milestones. Many of the milestones are interrelated and are dependent upon successful completion of other activities. Before DOE could agree to these negotiated commitments, a level of funding has to be estimated. Any use of the Interim Remedial Action process may directly impact the schedules and commitments for prioritized work.

One valid reason for using the Interim Remedial Action process at the Hanford Site would be to decrease the overall future costs of environmental restoration. The Agency has accounted for this potential future cost savings to a large extent, by the use of the operable unit prioritization process. In consideration of this prioritization system, the Region does not believe that the use of the Interim Remedial Action process in the next two years would result in a net reduction in future costs.

Idaho National Engineering Laboratory

The warm waste pond located in the test reactor area has a large loading of radioactive sludges contaminated with heavy metals. A water head is currently being utilized to minimize releases of radioactive materials. This current system may be contributing to chromate contamination. Therefore, chromate stabilization may be appropriate as an interim step while a remedial action is being developed.

Question 4. Approximately what funding levels would be required in each fiscal year 1990 and 1991 to carry out the totality of items identified in questions 1, 2, and 3?

Answer: The Agency would like to make clear that these answers submitted by the Regions are estimates as to the appropriate amount of funding required. The amounts have not undergone formal Agency review, nor do they represent "budget quality" figures.

REGION 4

Oak Ridge Reservation

The fiscal year 1990 budget is adequate and funding will accomplish the activities discussed in the Region's responses to questions 1–3 (*See*, pages 1, 6, and 10, respectively). The fiscal year 1991 budget is deficient and should be increased by a minimum of $53 million to accomplish the activities and needs as described below:

1. Develop low-level mixed waste disposal facilities at Y–12 ($10 million);
2. Perform corrective action activities at Bear Creek Valley located at Y–12 ($1.0 million originally budgeted, needs $11 million);
3. X–10 Solid Waste Storage Area 6 (i.e. conceptual designs and technology demonstrations such as grouting, in-situ vitrification ($5.2 million);
4. Interim response actions for the low-level mixed waste tanks (i.e. sub-surface investigations, waste removal, etc.) ($3.5 million);
5. Undesignated interim response actions at X–10 ($4 million);
6. Remedial action for the low-level mixed waste tanks (i.e. sub-surface investigations, waste removal, etc.) ($6 million);
7. Hydroactive plugging and abandoment of wells ($3 million); and
8. RCRA Facility Investigations and Remedial Investigations on lower priority solid waste management units at X–10 ($0 budgeted).

Savannah River Plant

The Region is unable to determine at this time if the amounts budgeted by DOE will be adequate for fiscal year 1990 and fiscal year 1991. The adequacy of the present budget requests will become more evident as the results of the RCRA Facility Investigations and Remedial Investigations become known. However, the Region believes that it is imperative that the funding be provided for the presently proposed budget in order to accomplish the goals and priorities of completing closure, whether by source removal or capping, of the RCRA regulated units and interim response actions/measures on the eighteen SWMUs with known releases.

Pinellas Plant

DOE has budgeted funds for fiscal year 1990 and fiscal year 1991 for continued assessment and cleanup of the known contaminated area. However, no funds have been budgeted for fiscal year 1990 and fiscal year 1991 for the RCRA Facility Investigations which would be the focused studies needed to determine what urgent problems or additional cleanup actions are needed. (This is based upon the Federal Facilities Information System A–106 Report dated 2/16/89.) Funding for the continued assessment and cleanup is vital to complete the present project and prevent future environmental problems and increased costs as well as funding for the RCRA Facility Investigations/studies for the same reasons.

REGION 5

Portsmouth Uranium Enrichment Complex

In fiscal year 1990, the Region estimates that approximately $12 million will be required to continue and possibly complete the RCRA Facility Investigation activities in all four quadrants of the facility and to complete interim measures. For fiscal year 1991, the Region anticipated that $10 million will be required to complete the RCRA Facility Investigation activities and to begin preparation of the Corrective Measure Study Reports.

Mound Plant

In 1989, approximately $1 million will be needed to study and begin the feasibility study of the Miami-Erie Canal, approximately $1.5 million will be needed to study and perform the feasibility study for seeps and migrating groundwater, and approximately $6 million will be required for cleanup of radioactive soils, debris, and structures.

In 1990, approximately $2.5 million will be needed for the Interim Response Action, Remedial Design and Remedial Action of the Miami-Erie Canal, approximately $2 million will be needed for the Interim Research Action seeps and migrating groundwater (assuming DOE will pump and treat), and approximately $3.5 million for the cleanup of radioactive soils, debris, and structures.

In 1991, approximately $3 million will be required for Remedial Design and Remedial Action of seeps and migrating groundwater, approximately $4.5 million will be needed for the Remedial action of the Miami-Erie Canal, and approximately $5.5 million will be required for cleanup of radioactive soils, debris, and structures.

Feed Materials Production Center

EPA is currently unable to estimate the funding levels that would be required in fiscal year 1990 and fiscal year 1991, since major cleanup activities will begin during this period. However, it can be assumed that a much greater amount of money will be required than that which is in the current fiscal year budget, as the program moves from the study to the cleanup phase.

REGION 6

Sandia National Laboratories

For DOE's investigation of the approximately sixty land disposal units during fiscal years 1990 and 1991, the RCRA Facility Investigation portion of the Hazardous and Solid Waste Amendments permit, and the soil sampling and other unsaturated zone sampling, approximately $45 million is needed.

For the focus studies that could be conducted in the next 2 years including those immediate measures required by the Hazardous and Solid Waste Amendments permit, the following estimates apply. For example, the cost for the installation of eight groundwater monitoring wells is $3.6 million, the cost for the installation of the six unsaturated zone wells is $60 thousand, the cost for the collection of additional disposal information is $.1 million, and the cost for taking 14 groundwater samples should be $.014 million.

Los Alamos National Laboratories

The Region deems that a RCRA Facility Investigation of the approximately 60 units required under the current permit should cost around $45 million. In addition, the closure of six RCRA landfills should cost approximately $6 million.

Focus studies that could be conducted in the next 2 years include a Gamma Spectrometer Areal Reconnaissance at a cost of approximately $.2 million. The Region believes that the cost for the interim measures are as follows: the installation of 15 new groundwater monitoring wells and analytical work ($15 thousand), the installation of twenty exploratory borings ($20 thousand), the installation of sediment traps ($10 thousand), the plugging of four wells ($20 thousand), and the installation of 40 vadose monitoring well ($200 thousand).

DOE Pantex Plant

Over the next 2 years, DOE needs to study the over 30 units with medium to low potential for contamination. Some of these units can be deleted during the initial phases of the RCRA Facility Investigation. This should cost approximately $5 million.

DOE will be conducting RCRA Facility Investigations at approximately 26 units that have a high potential for migration and subsequent human exposure. This should cost $19 million. A Corrective Measures Study on the two units with known plumes of contamination should cost approximately $5 million.

Approximately 27 units with a high to medium potential for releases which are not expected to present an imminent threat require a RCRA Facility Investigation during the next 2 years which should cost about $20.5 million.

REGION 7

DOE Kansas City Plant

The remediation of groundwater takes time. It is estimated that at least 10 to 20 years may be required to remediate the groundwater at this facility. For groundwater restoration EPA estimates it will cost DOE up to $100,000 per year to optimize the remediation and treatment of the hazardous constituents removed from the groundwater.

This figure addresses the installation of additional pumping wells for the DOE plant. Groundwater remediation is presently estimated by DOE for fiscal years 1990 and 1991 at $24,000 per year. DOE may have funds under another budget category appropriated for groundwater work. EPA believes that additional funds may be needed to allow DOE to optimize their present and planned groundwater remediation activities.

DOE's estimated contractor support costs for remediation/restoration at the facility is $1,748,000 for fiscal year 1990 and $3,994,000 for fiscal year 1991.

REGION 8

Rocky Flats Plant

DOE's resources have not been specifically and clearly defined for the EPA Regional Office. EPA has suggested a budget of $15,500,000 for fiscal year 1989 and $22,000,000 for fiscal year 1990 for environmental restoration activities at Rocky Flats Plant. Other cost estimates for Rocky Flats, quoted to Congress by DOE and the General Accounting Office in various studies include modernization of facilities and upgrades to safety as well as environmental restoration. To see Region 8's budget reviews, see enclosure 3.

REGION 9

Lawrence Livermore Laboratory

Funding levels for the activities described in the responses for Questions #1, #2, and #3 above (*see,* pages 5, 10, and 14, respectively) are as follows: for fiscal year 1990, $9.8 million and for fiscal year 1991, $11.3 million will be required at this facility.

At this time, Region 9 has no involvement with the Lawrence Livermore Laboratory Site 300, Sandia National Laboratory, and the DOE Nevada Test Site. The Region is, therefore, unable to provide information on specific activities needed at those sites. In general, the Region supports early abatement of any pressing environmental concerns such as migrating groundwater contamination or direct exposure to hazardous substances. The Region has no estimates of costs to perform these abatement activities except for the following provided by Lawrence Livermore Site 300: for fiscal year 1990, $7.5 million is required, and for fiscal year 1991, $7.3 million is required.

REGION 10

Hanford

The Region does not have a good estimate on the funding necessary for DOE to achieve the commitments and milestones referred to above. Now that the Hanford Federal Facility Agreement and Consent Order has been agreed to by all parties, it is critical that Congress appropriate the necessary funds to implement the Agreement. Without this necessary funding, DOE will not be able to comply with the aggressive schedules and milestones.

DOE has committed to a level of CERCLA and RCRA work over the next 5 years for which the cost has been estimated at $2.8 billion. The following is an example of the necessary funding levels for the Hanford Site over the next 2 fiscal years in order to achieve the 5 year commitment.

The Waste Operations, which include RCRA permits, new construction, ongoing management of RCRA units, effluent treatment upgrades, and RCRA groundwater monitoring wells, will require $200 million in fiscal year 1990 and $286 million in fiscal year 1991. For environmental restoration activities which include remedial investigations and cleanup under CERCLA and RCRA programs, closure activities for single-shell tanks, and closure activities for RCRA land disposal units $69 million for fiscal year 1990 and $93 million in fiscal year 1991 will be required. For the Hanford Waste Vitrification Plant which includes design and initial construction costs for a major high-level radioactive waste treatment plant, $45 million for fiscal year 1990 and $104 million for fiscal year 1991 will be necessary.

Idaho National Engineering Lab

The project of providing an alternate water supply and developing a treatment system for the contaminated drinking water should cost approximately $100,000. The pilot scale vapor extraction system which is scheduled for development this year under the Interagency Agreement should cost between $500,000 and $1,000,000. Finally, the new capping system should cost around $500,000.

Senator Exon. I thank you very much for that. I am convinced that Admiral Watkins and the Department are going to give us a thorough assessment of what money can be used. There is no use throwing money at a problem if the money cannot be adequately used.

But this is such a serious problem. I must say that those of us in the Congress who have been working on this for some time are going to pursue every possible means of getting information that we need to make sure that the amount of money is provided to meet the legitimate needs. Therefore, all we are doing is seeking background material to make sure that the right hand knows what the left hand is doing in this area.

If there has been one criticism that I think might apply to all of us, it is that we have ignored this problem far too long and neither the right hand nor the left hand in some instances even knew that there was another hand. Therefore, I simply say that we have got to work together so the questions that we are asking you and others is a cross-check toward the end of making sure that we are dotting every I and crossing every T.

Thank you for your answer, and if you get additional information we would appreciate your supplying that for the record.

Mr. Wade, turning to you and your organization, Admiral Watkins has stated that he hopes to reduce the long-term cost of the cleanup through technological advances and other means. Can you briefly explain the basis for this belief so that we might further understand it?

Mr. WADE. I really cannot give you any specifics today, Mr. Chairman, other than to say that, for example, the Department spends a fair amount of money on research on bioengineering, the use of micro-organisms for attacking different kinds of waste streams. The Admiral is not satisfied that we are either doing enough of that kind of research or applying the results of what we have gained from that research all across the Department's suite of waste problems.

I think he just believes that since we are a high tech agency that he needs to be assured that we are using the resources that we control properly and we perhaps have not been. We perhaps have not, as I said, institutionalized it to the point we really need to assure maximum benefit. I think he is kind of betting on the come, but his instincts I think are excellent. I suspect we will see some benefits from it.

Senator EXON. The last time you were here I inquired as to whether or not you had been advised or had been invited to stay on with the new administration. Has anything happened in that area since you were last here?

Mr. WADE. Admiral Watkins has asked me to stay on until he is comfortable with his transition. I have agreed to that. We have made no commitments beyond that.

Senator EXON. Mr. Wade, your testimony refers to a "program optimization system" used to make decisions on allocation of funds for environmental protection. You state that the system is used to identify the funding level that optimizes projected total benefits at minimum projected cost.

Can you give us a brief explanation of what units of measurement are used in this system and whether it is reviewed and coordinated outside of the Department? How is uniformity ensured across the DOD sites on these kinds of activities?

Mr. WADE. Mr. Chairman, with your permission, in the audience is Mr. Pat Whitfield, who is the expert on the Program Optimization System, and he can much more accurately respond to the question, if that is all right.

Senator **Exon**. Mr. Whitfield, would you come forward, please? Thank you very much and please proceed.

Mr. **Whitfield**. Thank you very much, Mr. Chairman.

Let me say that the Program Optimization System is not yet fully developed. It is built on work that was done in the past by institutions like the Stanford Research Institute. It is an attempt to reduce a very complex issue into a quantifiable system.

It starts on the premise that risks to public health and workers are the most important aspect. The program is then implemented by each of the field offices reviewing their problems and trying to assess the magnitude of the problems with regard to risk, with regard to regulatory compliance, with regard to continuation of the mission of the Department. That is peer-reviewed within the Department and each site is balanced against the other sites.

There are some several billion alternatives as a result of five funding levels that are manipulated by computer, and the output of that computer is the most benefit, if you will, from the dollars that are spent at any given dollar level.

That program is currently under review by a waste review group under contact to Virginia Polytechnic Institute and State University. It is also under review at the moment, I believe at the request of this committee, by the Office of Technology Assessment. We will be reviewing that activity in some detail as we prepare the 5-year plan that Admiral Watkins has initiated and that Mr. Wade has discussed here today.

The system is not perfect. It is not a priority ranking of one site versus another, if you will. It is a ranking of what benefit do you get in terms of reduction of risk, increased compliance, for the dollars that you have to spend. So in that regard it is only an aid to the decisions that are being made within the Department.

Senator **Exon**. Thank you very much.

Mr. Wade, on another subject, at the first of this committee's five DOE oversight hearings this year I encouraged DOE to establish centers of excellence at its principal facilities, starting with Savannah River. Admiral Watkins' recent letter on waste cleanup activities mentions using a lead laboratory concept to focus cleanup activities.

Is this a related effort and how will all of these things be implemented together so that they are effective?

Mr. **Wade**. I think Admiral Watkins sensed the same thing as you did, Senator Exon. We have had two "centers of excellence" in the waste area, one at Oak Ridge and one at Richland. When the Admiral began looking at the technologies that were being used and reviewed all across the complex, he said that we probably ought to have an enhanced lead laboratory concept so that we had a lead laboratory, for example, looking at bioengineering solutions cross the complex and another lead laboratory that might be looking at plasma solutions across the complex.

You will see, I think, a great deal of effort on focusing our research efforts into lead laboratories or centers of excellence.

Senator **Exon**. Thank you very much.

The last question I have is either to Mr. Wade or Mr. Berube. If additional funds were available for environmental restoration beyond the $400 million sought in the fiscal year 1990 budget, how would these be applied or could they be used to accelerate actual cleanup efforts? Or would they be devoted to more paper studies that I think do not do a whole lot of good? I am only pressing forward to make sure that we have the amount of money that could be usefully used.

To choose a better phrase, I know and have heard testimony in front of this subcommittee and also over in the Budget Committee by Secretary Watkins, and I do not question for a moment that he is not going to come back, as he has indicated he would, and tell us very firmly if more money is necessary.

I am just continuing to push that particular theme to make sure that we in the Congress provide all money that is necessary or could be usefully employed to move this effort along faster.

Mr. **Wade**. I can only add to that, Senator, by saying that, as you know, the schedule that he has levied on us says that we must have the first draft of these 5-year plans by August of this year. The goal is to use them as the basis for the 1991 budget submission. But it also will provide us a very clear look at whether or not we have correctly allocated 1990 funds and where we might have shortfalls.

So I suspect in August we will have a much better answer to the question about whether or not we could effectively use more 1990 funds.

Senator **Exon**. That sounds reasonable and I go along with that. I appreciate the thoughtful job that I think you are all trying to do in this area.

I keep pressing this because I think you all know we are way behind the curve. We are way, way behind the curve on this, and at least I get the feeling that we are moving in the right direction now. I just want to assure all of you that you have the cooperation from this branch of Government and we will be providing funds that you tell us you can usefully use.

Thank you very much. Before I close down, I want to give those witnesses that we have had this morning that have not had much of anything to say, I would just like say, Mr. Grundler, Mr. Berube, or anyone else that has anything to say in this area, we would be very glad to hear from you.

Ms. Friedman, let us start with you. Is there anything?

Ms. **Friedman**. I have nothing to add.

Mr. **Grundler**. Nothing further, thank you.

Mr. **Berube**. Mr. Chairman, thank you for the opportunity but I have nothing to add.

Senator **Exon**. I can see you work for a tough taskmaster. In any event, thank you all very much for being here. I think we have had a very informative hearing, and I just hope that through these hearings we can have a better understanding of the drive and desire of all of us that are trying to work together cooperatively on this mammouth effort.

Thank you very much, and we are adjourned. There will be additional questions, I might add, for the record that we would appreciate your answering as soon as possible.

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR J. JAMES EXON

ENVIRONMENTAL PRIORITIES FOR THE NUCLEAR WEAPONS COMPLEX

Senator EXON. Mr. Berube, please compare DOD's Defense Environmental Restoration Program with DOE's Environmental Restoration program. How is DOD's Defense Priority model similar to or different from DOE's model?

Mr. BERUBE. The DOD and DOE environmental restoration programs are quite similar. Indeed, the DOE program was modeled after the more mature DOD program. Some differences between the two programs include:

DOD has 897 major installations in 50 States and territories, with over 8,100 potential sites that merit evaluation. DOE has 17 major facilities in 12 States with perhaps 3,000 sites requiring some type of evaluation. Significantly, many DOE sites contain mixed waste (i.e., chemical and radioactive) while very few DOD sites contain such waste.

Generally, DOD does not use its environmental restoration account to pay for closures conducted under RCRA. The DOE environmental restoration account for Defense Programs covers such expenses, which can be substantial.

With regard to the comparison of DOD's Defense Priority Model (DPM) and DOE's model, some background information is necessary. The DPM is quite similar to the EPA's Hazard Ranking System (HRS). Preliminary data are used to calculate a numerical score representing the potential threat to the public and the environment. The DPM is more complete than the HRS, however, in its accounting of the factors that influence risk to people and the environment from hazardous waste sites (EPA has recently published for public comment a revised HRS). Both the HRS and the DPM use a structured-value approach (i.e., they both rely upon judgments as to the significance of each ranked factor) and manually calculate a numerical score indicative of risk.

DOE, as part of its Environmental Survey Program, developed a physics-based endangered assessment method known as the Multimedia Environmental Pollutant Assessment System (MEPAS). MEPAS is a computer-based system that uses empirically and analytically based mathematical equations to describe release, transport, and exposure over fairly long-time horizons. As a result, MEPAS scores may more accurately reflect the potential risk to public health.

WASTE MANAGEMENT VERSUS ENVIRONMENTAL RESTORATION

Senator EXON. Mr. Wade, the fiscal year 1990 budget request states that "the primary mission of the Defense Waste and Environmental Restoration program is to provide safe interim storage, processing, transportation, and ultimate disposal of radioactive and hazardous wastes generated primarily from nuclear materials production." Does this mean that the waste management program is considered a higher priority than environmental restoration? Should these two separate efforts continue to be part of the same program or should they be formally separated?

Mr. WADE. The initial paragraph of the Overview section of the fiscal year 1990 Defense Waste and Environmental Restoration (DWER) budget request is not intended to indicate that management of waste operations is considered a higher priority than environmental restoration.

The Department has initiated the preparation of an integrated 5-Year Plan that will characterize and prioritize all Environmental Restoration and Waste Management activities at DOE sites. This comprehensive plan will encompass defense waste management operations, inactive waste site cleanup, and corrective actions needed for all DOE operating facilities.

A final draft of the 5-year plan will be completed in August 1989. This plan will consolidate all DOE cleanup activities into a single, integrated action plan. The document will also be used to reaffirm fiscal year 1990 activities as well as to serve as a baseline for fiscal year 1991 programs and budget requests. Moreover, this planning effort will help DOE to assess current technology development activities and provide the basis for future research, development, demonstration testing and evaluation of new and innovative technologies.

The 5-year plan will: (1) determine the steps necessary to confine and correct immediate problems that pose the greatest threat to public health and safety; (2) ensure that long-range cleanup plans are based on credible science and technology; and (3) ensure DOE compliance with all applicable environmental laws, regulations, and standards.

STANDARD FOR POLLUTION DISCHARGE

Senator EXON. Mr. Berube, there are at least two ways to measure groundwater contamination at DOE facilities. One measures contamination only in terms of leakage beyond the boundary of the *facility;* the other measures leakage beyond the *entire plant's* boundary. Which measure does DOE use and why?

Mr. BERUBE. DOE monitors groundwater for contamination in compliance with applicable environmental requirements and to provide assurance that the impacts of DOE's facilities are well characterized. Groundwater is monitored at the facility or disposal unit in compliance with Federal and State environmental requirements. Also, if a release has occurred, groundwater is monitored at and beyond the furthest extent of the contamination to characterize the impacts and to provide a sound basis for remedial measures to clean up the contamination in full compliance with environmental requirements.

ENVIRONMENTAL SURVEY

Senator EXON. Mr. Berube, DOE is conducting an Environmental Survey, which, as you have previously indicated is a 3-year, $60 million effort to identify and rank the environmental problems and areas of environmental risk at DOE operating facilities. Has the model used to generate the rankings of environmental problems in the environmental survey been approved by EPA? If not, how does the model account for the cleanup schedules established by the federal facility agreements that are being concluded between DOE, EPA, and the states?

Mr. BERUBE. The model being used to rank environmental problems and environmental risks at DOE operating facilities is the Multimedia Environmental Pollutant Assessment System (MEPAS), developed by the Pacific Northwest Laboratory (PNL). It is an enhancement of a model called the Remedial Action Priority System (RAPS) that was also developed by PNL. The RAPS model has been reviewed by a peer review group that included 2 representatives from EPA among its 9 members. The peer review group assessed the scientific and mathematical validity of the model and approved of its use by DOE for its intended purpose. None of the peer review group members spoke for their respective organizations. They merely provided their own technical expertise to the review process.

Through the MEPAS model, the rankings presented in the Environmental Survey Preliminary Summary Report of the Defense Production Facilities are generated based on potential public health impacts. The ranking process also factors in environmental degradation to develop the ranking results. Neither federal facility agreements nor other compliance issues are factored into the ranking results presented in that report.

The ranking results are useful to both DOE facility managers and Headquarters program managers. At the facility level, the ranking from MEPAS serves as a guide in negotiating agreements by identifying high priority sites to be addressed within the action plans of their federal facility agreements and in developing inputs to the Environmental Restoration and Waste Management 5-Year Plan. At the Headquarters level, the ranking results are useful in the development of the 5-Year Plan by enabling program managers to assure that problems that pose significant public health risks are given the necessary priority consideration.

The Department has undertaken an integrated, 5-year planning effort (outlined in the answer to question 2) to characterize and prioritize all environmental restoration and waste management activities at DOE sites. DOE will utilize a yet-to-be-determined, risk-based system to prioritize DOE's environmental restoration activities. This system will be developed in consultation with EPA, the National Academy of Sciences, and States and Indian Nations and be an improvement over such currently used models, as MEPAS, the Prioritization Optimization System, and the Hazard Ranking System.

ENVIRONMENT, SAFETY, AND HEALTH (ES&H)

Senator EXON. Mr. Berube, the Environment, Safety, and Health Needs report indicates that 4 areas are particularly important at Savannah River: (1) enhanced reactor safety; (2) improved fire protection; (3) RCRA compliance/groundwater protection; and (4) radioactive waste management. What are the expected funding requirements for each of these matters and what has been requested in the fiscal year 1990 budget to meet these needs?

Mr. BERUBE. We will be reviewing the expected funding requirements for these activities. We expect that within a few months we will be able to establish appropriate future funding levels and priorities for these activities. Certainly it will require substantial on-going funding for these activities. As for the improved fire protection, based on independent surveys, we have some early estimates that indicate the cost will be approximately $500 million. However, we will be closely reviewing this number in the course of the fiscal year 1991 budget process.

Let me address the second part of your question in a table for the record:

Fiscal year 1990—dollar amounts in millions

Enhanced Reactor Safety	$123.9
Improved Fire Protection	7.9
RCRA/Groundwater Protection	104.9
Radioactive Waste Management	228.1

TRANSURANIC WASTE DISPOSAL

Senator EXON. Mr. Wade, one of the most serious waste management problems facing DOE is the transuranic waste that has been buried, not stored, throughout the nuclear weapons complex. This buried waste accounts for approximately two thirds of the total volume of TRU waste. The remaining one third is retrievably stored and is intended eventually to be permanently stored at the Waste Isolation Pilot Plant in New Mexico. What does DOE plan to do with the almost 200,000 cubic meters of buried TRU waste that will not be stored at WIPP? Does the waste management costs in the 2010 study include the costs of characterizing, assessing, and disposing of the buried transuranic waste?

Mr. WADE. DOE buried transuranic waste sites have been incorporated in the Environmental Restoration Program for characterization and remedial action. Prior to 1970 this waste was disposed of as low-level waste, although it contained some fraction of waste that has subsequently been defined as transuranic (TRU). Characterization of the buried TRU waste sites will not be completed until the early to mid-1990s. Based on initial investigations, a major part of the buried waste appears to be low-level waste. Until characterization is completed and remedial measures are demonstrated and selected, the portion of TRU material which can and should be exhumed safely has not been determined. Several technologies are under development which show promise for either in-place vitrification and eventual removal or stabilization of this type waste in place if it appears to be an environmentally acceptable option.

WASTE DISPOSAL

Senator EXON. Mr. Berube, does DOE still dispose of untreated mixed wastes by depositing them directly in the ground? If so, why has this practice not ceased?

Mr. BERUBE. DOE no longer disposes of untreated mixed wastes by land disposal. Comprehensive waste characterization activities are still ongoing at some DOE facilities to assure adherence to this policy. In general, mixed waste is being stored in accordance with applicable requirements pending permitting of proper disposal facilities.

WASTE MANAGEMENT

Senator EXON. Mr. Wade, the 2010 Report states, with respect to waste disposal practices, [and I quote], "if new regulations are not met, DOE facilities could be closed, impairing the continuity of production operations." What conditions would force the closing of even more production operations than are already shut today? What steps is DOE taking to ensure that we do not reach this point?

Mr. WADE. Current curtailment of operations at DOE facilities has resulted mainly from consideration of safety factors and has been implemented at DOE's initiative.

In addition to safety factors, non-compliance with applicable environmental standards could result in enforcement actions by regulatory agencies or legal action by citizens which could potentially impact DOE operations.

DOE is currently preparing an integrated Environmental Restoration and Waste Management 5-Year Plan to address all environmental and waste management concerns.

A draft plan will be available by August 1989 which will be used to reaffirm the 1990 budget and formulate the fiscal year 1991 budget request as well as project future strategies and requirements to avoid further curtailment or operations.

WASTE MINIMIZATION EFFORTS

Senator **Exon**. Please describe the elements of DOE's waste minimization program?

Mr. **Wade**. The Department has practiced waste minimization on an ad hoc basis in its radioactive waste management program for many years. These practices involve improvements to waste storage, treatment and disposal practices and recovery/reuse activities for waste already generated. We have recently begun to formalize waste minimization programs for radioactive, hazardous and mixed wastes at our national laboratories and operating facilities.

The Secretary has initiated three priority programs which have a waste minimization component. The Environmental Restoration and Waste Management 5-Year Plan will prioritize the Department's waste management and environmental cleanup program, and will include an assessment of current environmental technologies. A second applied research, development and demonstration program will include developing new technologies and management concepts to minimize waste. And the Department's modernization efforts will incorporate new processes and technologies that can avoid the use of hazardous materials while at the same time meeting our production requirements.

The Department has issued Order DOE 5400.1, *General Environmental Protection Program*, requiring all DOE operating facilities to develop a waste minimization program and plan for hazardous, radioactive and mixed wastes. The Order directs DOE facilities to develop specific goals for minimizing the volume of toxicity of waste generated, with annual reductions if programmatic requirements allow; to track and compare annual changes in waste volume and toxicity; and to identify and report on proposed source reduction and recycling methods to accomplish waste minimization that are technically and economically practicable.

As a follow-up to the Order, a Department-wide policy will be prepared defining DOE's waste minimization objectives and general goals. Detailed guidance is under preparation that will specify reporting requirements and schedules for implementing a waste minimization program.

Order DOE 5820.2A, *Radioactive Waste Management*, sets the policy that the generation, treatment, storage, transportation and/or disposal of radioactive wastes, and the other pollutants or hazardous substances they contain, shall be accomplished in a manner that minimizes the generation of such wastes across program office functions. Each generating facility must develop and implement processing programs and techniques to reduce the quantity of waste being sent to storage. Technical and administrative controls such as materials substitution and process optimization must be used to reduce the generation of high-level, transuranic and low-level wastes. An auditable program (goals, incentives, reports, etc.) will be established and achievements will be reported annually.

DOE's Office of Defense Programs (DP) has developed a specific waste reduction policy establishing a hierarchy of waste minimization and treatment actions. First, DP facilities will avoid, as far as practicable, the generation of low-level, high-level, transuranic, hazardous and mixed (i.e. radioactive and hazardous) wastes. Secondly, where wastes are unavoidably generated, the facilities will attempt to recycle or reuse all or part of the waste stream components. And finally, the facilities will treat the remaining non-reusable wastes to further reduce toxicity or volume.

A Waste Reduction Steering Committee has been organized within the Office of Defense Programs to coordinate and lead their waste reduction program. Visits to facilities, establishment of waste reduction goals, a uniform reporting system, and workshops are among planned future actions.

WASTE FEE

Senator **Exon**. Mr. Wade, the Nuclear Waste Policy Act established a Nuclear Waste fund to which DOE must contribute to dispose of its Defense high level waste in a civilian repository which is expected to be located at Yucca Mountain, Nevada. How are DOE Defense Programs expected to pay for the disposal of high-level wastes from the production reactors and when would such payments begin?

Mr. **Wade**. For background, section 8(b)2 of the Nuclear Waste Policy Act (NWPA) requires the Department to pay into the Nuclear Waste Fund its allocation of costs for the disposal of defense high-level waste (DHLW) once the President determined a defense-only repository was not needed. The Office of Defense Programs (DP) and the Office of Civilian Radioactive Waste Management (RW) worked together to develop a cost allocation method to determine the DHLW cost share. The final method was published in the Federal Register on August 20, 1987. Reviews of the published method by the Office of the Inspector General and the General Accounting Office found the allocation method to be appropriate.

The Department has evaluated several payment options that could be used to pay its share of disposal costs. Possible payment options include: pay interest only now and balance later, equal annual payments, pay-as-you-go (DP cost share of annual RW budget), and annual or per-canister payments at production or delivery. Options with annual payments could begin at the next appropriate budget cycle. Delayed payments would be tied to production or delivery of the canisters to the repository. The final payment method, the form of the budget request to be used, and the form of the actual payment (interagency transfer, etc.) have not been established yet.

DECONTAMINATION AND DECOMMISSIONING

Senator Exon. Mr. Wade, one of DOE's long-term cleanup efforts is the decontamination and decommissioning of radioactively contaminated buildings and structures that are no longer in use. I believe the 2010 study indicated that DOE defense programs had completed the decontamination and decommissioning of 43 facilities by the end of fiscal year 1988; however, it also stated that by 1995 more than *350* additional DOE facilities will require decontamination and decommissioning. Are these all defense-related facilities or has DOE defense programs become responsible for the non-defense facilities as well? If so, do the non-defense programs pay their share for decontamination and decommissioning of their old facilities?

Mr. Wade. The Office of Defense Programs is responsible for decontaminating and decommissioning all defense-related facilities. It is correct that more than 350 additional defense-related DOE facilities will require decontamination and decommissioning by 1995. These facilities are all defense-related buildings and structures. The cost of performing Decontamination and Decommission actions at non-defense facilities would be paid by the appropriate DOE program office.

RELOCATING NUCLEAR OPERATIONS

Senator Exon. Mr. Wade, the 2010 study recommends relocating the nuclear operations that are presently performed at the Rocky Flats plant in Colorado over a period of approximately 15 years. Would this relocation save money and minimize the impact to the environment of plutonium operations?

Mr. Wade. It is expected that the relocation of the Rocky Flats Plant (RFP) to an existing Department of Energy site will result in reduced annual costs of operations. However, the paycheck period (the cost of relocation divided by the expected savings) is such that the move cannot be justified on economics alone. The demographics of the area have changed such that the plant can no longer be considered remote.

The environmental impact of relocating Rocky Flats plutonium operations will be determined as DOE completes the required NEPA documentation.

FISCAL YEAR 1990 BUDGET REQUEST AND NEEDS

Senator Exon. Mr. Wade, can you please explain the relationship between environmental expenditures for DOE facilities in the fiscal year 1990 budget request and the total "needs" of each DOE defense facility? In other words, can one extrapolate from the fiscal year 1990 budget request for a particular facility to determine how many resources DOE intends to devote to that facility over the next 20 years? Or is such funding essentially not linear?

Mr. Wade. The environmental expenditures for DOE facilities in the fiscal year 1990 budget request only reflect the needs of each site for fiscal year 1990. You cannot automatically correlate these fiscal year 1990 requirements with future needs on a site-by-site basis. We will have a clearer picture of the total resource requirements for each DOE defense facility in August after we issue the Environmental Restoration and Waste Management 5-Year Plan in draft form.

CLEANUP PROJECTS

Senator Exon. Mr. Berube, please review the attached list of "DOE nuclear weapons complex environmental compliance projects in violation of established standards that have not been budgeted for fiscal year 1990," and (1) identify which of the 46 projects are funded in the fiscal year 1990 budget request; (2) indicate the schedule for completion of each project; and (3) indicate the funding required in fiscal year 1990 and beyond to complete each project.

Mr. Berube. The result of our review of the list are set forth in the following table.

DEPARTMENT OF ENERGY
DOE NUCLEAR WEAPONS COMPLEX ENVIRONMENTAL COMPLIANCE PROJECTS
IN VIOLATION OF ESTABLISHED STANDARDS
(In Thousands of Dollars)

Program	Facility	Contract #	Description	Status	Media	Completion Date	FY 1990 Budget Request	Future Years Funding Requirements FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	Beyond FY 1995
DWER	Hanford	HEC-W-049 a/	200 Area Effluent a/&b/	ESDP	MM	FY 1996	$ 487	$ 36	$ 6,008	$10,800	$ 9,000	$ 3,500	NFR
DWER	Hanford	W-014/W-017 a/	200W Groundwater Wells b/	INOV	Solid	FY 1993	2,900	3,000	2,808	NFR	NFR	NFR	NFR
DWER	Nevada	NV03 c/	RCRA Part B Permit/NTS c/	INOV	MM	9/30/90	800	NFR	NFR	NFR	NFR	NFR	NFR
DWER	Nevada	NV12 d/	Leachfields & Dumps d/	INOV	MM	9/99	NFR	650	650	TBD	TBD	TBD	TBD
DWER	Nevada	NV13 e/	Sumps/Injection Wells e/	INOV	MM	9/98	NFR	200	600	TBD	TBD	TBD	TBD
DWER	Nevada	NV14 f/	RI/FS for Offsite Loc. f/	INOV	MM	9/99	NFR	250	1,000	1,000	TBD	TBD	TBD
Weapons	Rocky Flats	1ALRFP001	Groundwater Qual. Assmt.	ESDP	Solid	FY 1989	NFR	NFR	NFR	NFR	NFR	NFR	NFR
Weapons	Los Alamos	LA-27	PCB Disposal	ESDP	TSCA		NFR	NFR	NFR	731	1,165	1,456	NFR
Weapons	Los Alamos	1ALLANL016	Preparation of RCRA B	INOV	Solid	FY 1989	NFR	NFR	NFR	NFR	NFR	NFR	NFR
Weapons	Pantex	1ALPX007	Temp. Water Cleaning Sys.	ESDP	Solid	FY 1989	NFR	NFR	NFR	NFR	NFR	NFR	NFR
Weapons	Pantex	1ALPX008	RCRA Classified Staging	ESDP	MM	FY 1990	1,200	NFR	NFR	NFR	NFR	NFR	NFR
Weapons	Pantex	1ALPX009	Haz. Waste Staging Facil.	ESDP	MM	FY 1991	100	1,100	NFR	NFR	NFR	NFR	NFR
ER	Berkeley	5SFBL0019	Transformer Pads Modif.	INOV*	Water	11/90	165	NFR	NFR	NFR	NFR	NFR	NFR
ER	Berkeley	5SFBL0022	B74 Sanitary Sewer Mtrg.	ESDP*	Water	12/93	NFR	NFR	520	NFR	NFR	NFR	NFR
ER	Berkeley	5SFBL0036	Sanitary Sewer Invest.	ESDP*	Water	12/93	NFR	NFR	160	NFR	NFR	NFR	NFR
ER	Berkeley	5SFBL008	DI Columns Regen. Rplcmt.	INOV*	Water	7/92	40	100	NFR	NFR	NFR	NFR	NFR
ER	Berkeley	5SFBL009	B76 Wastewater-Oil Sep.	INOV*	Water	4/89	NFR	NFR	NFR	NFR	NFR	NFR	NFR
DWER	INEL	E5.1.8	TRA Liq. Radwaste Clean	ESDP	Water	4089	NFR	NFR	NFR	NFR	NFR	NFR	NFR
ER	Brookhaven	88CHBNL008 g/	Cesspool Remediation g/	ESDP	Water	FY 1990	253	NFR	NFR	NFR	NFR	NFR	NFR
ER	Brookhaven	89CHBNL016 g/	Bldg. 830 Spill Remed. g/	ESDP	Solid	FY 1989	NFR	NFR	NFR	NFR	NFR	NFR	NFR
DWER	Savannah	1SRSRP006	Restor. Settling Basin H	INOV	Solid	1090	NFR	NFR	NFR	NFR	NFR	NFR	NFR
NMP	Savannah	1SRSRP053	F & H Effluent Treatment	ESDP	Solid	11/88	NFR	NFR	NFR	NFR	NFR	NFR	NFR
URE	Portsmouth	20RPOR1101	Elimination of PCB Cont.	INOV	TSCA	FY 1996	NFR	4,000	24,058	NFR	NFR	NFR	NFR
URE	Portsmouth	20RPOR1107	X-752 Hazardous Stor.	INOV	Solid	10/89	NFR	NFR	NFR	NFR	NFR	NFR	NFR
Weapons	Y-12 Plant	1ORY12017	Spill Prevention Facil.	ESDP	Water	6/89	NFR	NFR	NFR	NFR	NFR	NFR	NFR
Weapons	Y-12 Plant	1ORY12046	Disposal Area Remedial	ESDP	Solid	5/90	NFR	NFR	NFR	NFR	NFR	NFR	NFR
Weapons	Y-12 Plant	1ORY12064	Mercury Reduction Effl.	ESDP	Water	5/88	NFR	NFR	NFR	NFR	NFR	NFR	NFR
DWER	Oak Ridge	20RORGD059	NPDES Flow Sys. Upgrade	ESDP	Water	11/89	NFR	NFR	NFR	NFR	NFR	NFR	NFR
DWER	Oak Ridge	5ORORNL203	Emergency Power System	ESDP	Air	9/91	300	NFR	NFR	NFR	NFR	NFR	NFR
	Oak Ridge	5ORORNL205	Ventilation Upgrade	ESDP	Air	9/95	NFR	NFR	NFR	1,000	NFR	NFR	NFR
	Oak Ridge	5ORORNL208	Upgrade Cell Filtration	ESDP	Air	11/89	NFR	NFR	NFR	NFR	NFR	NFR	NFR
ER	Oak Ridge	5ORORNL209	Upgrade Filter Pits	ESDP	Air	9/91	NFR	NFR	NFR	NFR	NFR	NFR	NFR
DWER	Oak Ridge	5ORORNL213	Install Emerg. Elec. Gen.	ESDP	Air	Cancelled - Not Required by Operational Safety Requirements.							

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*According to DOE/SAM's record, these projects have not received any notices of violation from the EPA.

NFR: No funding required since project has been completed in prior fiscal years.

DEPARTMENT OF ENERGY
DOE NUCLEAR WEAPONS COMPLEX ENVIRONMENTAL COMPLIANCE PROJECTS
IN VIOLATION OF ESTABLISHED STANDARDS
(In Thousands of Dollars)

Program	Facility	Contract #	Description	Status	Media	Completion Date	FY 1990 Budget Request	Future Years Funding Requirements FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	Beyond FY 1995
Mag Fus.	Oak Ridge	SORORNL320	Steam Plant Waste Sys.	ESDP	Water	9/89	$ NFR	$ NFR	$ NFR	$ NFR	$ NFR	$ NFR	$ NFR
ER	Oak Ridge	SORORNL330	Wastewater Piping Rplc.	ESDP	Water	9/91	NFR	NFR	NFR	NFR	NFR	NFR	NFR
ER	Oak Ridge	SORORNL377	Equipment Decon. Facil.	ESDP	Radn.	9/93	NFR	NFR	1,000	NFR	NFR	NFR	NFR
DWER	Oak Ridge	SORORNL378	Bldg. 3544 Floor Contain.	ESDP	Radn.	9/91	NFR	NFR	NFR	NFR	NFR	NFR	NFR
DWER	Oak Ridge	SORORNL417	Equip. Cleaning Facil.	ESDP	Water	8/88	NFR	NFR	NFR	NFR	NFR	NFR	NFR
ER	Oak Ridge	SORORNL421	Expand Mixed Waste Stor.	ESDP	MM	9/91	NFR	NFR	NFR	NFR	NFR	NFR	NFR
DWER	Oak Ridge	SORORNL426	TRU/SLLW Staging Facil.	ESDP	Solid	9/90	NFR	NFR	NFR	NFR	NFR	NFR	NFR
DWER	Oak Ridge	SORORNL442	Evaporator Cooling Twr.	ESDP	Water	9/90	NFR	NFR	NFR	NFR	NFR	NFR	NFR
Mag Fus.	Oak Ridge	SORORNL624	Stack Monitoring Improv.	ESDP	Air	9/91	NFR	NFR	NFR	NFR	NFR	NFR	NFR
ER	Oak Ridge	SORORNL628	Improve Local Air Monit.	ESDP	Air	9/93	NFR	NFR	500	NFR	NFR	NFR	NFR
ER	Oak Ridge	SORORNL629	Surface Water Monitor.	ESDP	Water	9/91	NFR	NFR	NFR	NFR	NFR	NFR	NFR
Mag Fus.	Oak Ridge	SORORNL630	MHF & HVST Stack Monitg.	ESDP	Air	9/92	NFR	700	NFR	NFR	NFR	NFR	NFR
ER	Oak Ridge	SORORNL632	3020 Stack Monitor Impr.	ESDP	Air	9/91	NFR	NFR	NFR	NFR	NFR	NFR	NFR
ER	Oak Ridge	SORORNL635	Meteor. Tower Upgrade	ESDP	Air	9/92	NFR	200	NFR	NFR	NFR	NFR	NFR

TOTAL OF 46 PROJECTS

Definitions

INOV: EPA has issued a notice of violation to the agency.
ESDP: EPA considers the project to be violating an established standard where the compliance deadline has passed.
MM: Multi-media, or projects which must meet standards under a number of laws.
Air: Clean Air Act.
Water: Clean Water Act.
Radn: Atomic Energy Act.
Solid: Solid Waste and Resource Conservation and Recovery Act.
TSCA: Toxic Substances Control Act.

a/ There is no line item funding for Project W-049, 200 Area Effluent, in the FY 1990 Budget. This an FY 1992 subproject under Hanford Environmental Compliance Project, 89-D-172. However, there is operating funding in FY 1989-FY 1991 budgets for expense support to the project. This involves completion of engineering studies, functional design criteria and conceptional design report.

b/ Project W-014, 200W Groundwater Monitoring Wells, has been completed using GPP funding. In addition to this project, Hanford has identified the need to provide additional RCRA monitoring wells. The additional monitoring wells appear as an FY 1989 subproject, W-017, in the Hanford Environmental Compliance Project, 89-D-172.

Hanford has a commitment to discontinue discharges of contaminated effluents into the soil column as defined in the "March 1987 Plan and Schedule to Discontinue Charges of Contaminated Liquids into the soil Column at Hanford." These discharges are done in accordance with current DOE directives. Completion of the 200 Area Treated Effluent Disposal Facility (W-049) supports the referenced plan and schedule.

c/ Involves three permits, as follows:

(1) Explosive Ordinance Disposal Facility; site characterization is required to complete Part B application. FY 1990 funding $380K.

(2) U2bu Crater - Modification to Part B application for U2bu to resume operation. Funding is $280K for FY 1990.

(3) Decontamination Pond, Area 6, RCRA Closure Plan for Area 6 Decontamination Pond will start in FY 1990. Funding is $300K for FY 1990.

d/ The studies will begin in FY 1991 and be completed in FY 1992 at $650K per year. Corrective action funding will depend upon actions identified as required by RI/FS. Planned completion for the leach fields in September 1996 and for the waste dumps in September 1999.

e/ The studies will begin in FY 1991 and be completed in FY 1992 at $280K for FY 1991 and $600K for FY 1992. There is no FY 1990 funding planned. Corrective action funding will depend upon actions identified as required RI/FS. Planned completion is September 1998.

f/ The studies will begin in FY 1991 and be completed in FY 1993 at $250K for FY 1991 and approximately $1 million per year for FY 1992 and FY 1993. There is no FY 1990 funding planned. Corrective action funding will depend upon actions identified as required by RI/FS. Planned completion is September 1999.

g/ Project is not a DOE Nuclear Weapons Complex Environmental Compliance Project.

Senator **Exon**. Mr. Diamond, as you probably know, the modernization study recommends relocating the nuclear operations that are presently performed at the Rocky Flats plant in Colorado over a period of about fifteen years. In EPA's view, would such a relocation reduce the impact to the environment of plutonium operations?

Mr. **Diamond**. I believe that relocating the nuclear operations which are currently performed at the Rocky Flats Plant would reduce the overall environmental impacts from the facility. To what extent these impacts would be reduced is difficult to quantify, as we cannot predict the precise environmental impacts from such a relocation.

Senator **Exon**. Mr. Diamond, does EPA support the model used by DOE in its Environmental Survey? Was EPA ever asked to formally approve this model? What is EPA's role in development of DOD's model for environmental cleanup?

Mr. **Diamond**. EPA cannot support or oppose the model used by DOE in its Environmental Survey because the Agency was never asked to formally approve the model nor has EPA conducted an Agency review of the model. EPA understands that DOE is undertaking a major new effort to develop a 5-year plan for returning the nuclear weapons complex to compliance and setting priorities for cleanup. DOE has stated it wants EPA to participate in this planning and EPA is looking forward to involvement in such planning. Regarding the DOD Defense Prioritization model, EPA was not involved in the development of the model. However, EPA has reviewed the DOD model and transmitted comments to DOD (Enclosure 1).

ENCLOSURE 1

U.S. ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE,
Washington, DC, August 11, 1988.

Mr. WILLIAM H. PARKER III,
Deputy Assistant Secretary of Defense (Environment),
OASD (P&L), Washington, DC.

DEAR MR. PARKER: Thank you for giving us the opportunity to review the Defense Priority Model (DPM). We support the intended purpose of the DPM: to rank sites according to potential risk to human health and the environment in order to assist decision-makers in identifying priorities for remedial action and to aid future year budget development.

EPA agrees with the Department of Defense (DOD) policy of addressing worst sites first, which is the reason for developing and using the DPM. We also agree with DOD's efforts to establish a methodology for determining priorities for remedial action of which the DPM is a major part. After concluding a technical analysis of the DPM in the context of this policy, however, we have concerns about the ability of the DPM to meet its intended purpose.

EPA's cleanup priorities in the Superfund program are these sites listed on the National Priorities List (NPL), including Federal facilities. Section 120 sets out schedules for cleaning up NPL sites. These NPL sites should be worst. Using DPM to help determine where remedial actions will occur first, therefore, raises a significant policy concern on our part. If EPA's and DOD's priority sites are the same, then expenditures of money and effort for remedial actions will be most cost and time-efficient. If DOD depends significantly on the DPM for determining priority sites, then there may be a potential conflict resulting in identifying sites for funding that may not pose as significant a risk as some that scored lower using the DPM.

The enclosed analysis highlights EPA concerns from a technical standpoint. The major technical conclusions of our analysis are summarized below and are addressed in detail in the attached report:

> A site ranking system should account for two important exposure pathways: air releases and direct contact (i.e., contaminated soil). We are concerned that the DPM does not take these pathways into account;
>
> The DPM does not discriminate well among sites with observed releases. This is a significant concern because many of the sites to which the model will be applied will have observed releases;
>
> It is important that data generated during the RI/FS be fully utilized. The DPM does not appear to be able to incorporate sophisticated data. For example, the model does not account for contaminant mobility or documented evidence of human exposure; and
>
> Based on available technical evidence, the DPM may not rank sites accurately by relative threat to human health and the environment.

Although we agree with the premise of addressing worst sites first and of developing a methodology which ranks sites in order of risk to human health and the environment, we have reservations as to whether the DPM is the right analytical tool to use in this process because of its limitations.

We recommend that DOD consider not using the DPM, as it is currently structured, for determining remedial priorities. Furthermore, it may be difficult to refine the DPM by adding individual factors or changing scoring algorithms because these factors are so interrelated. Such changes also would not overcome the DPM's inability to incorporate data generated during the RI/FS. DOD may want to consider other types of modeling systems that are more flexible and are able to account for risk-related types of data.

We hope that our analysis is helpful in establishing a useful priority system for remedial actions and wish to continue our discussions with DOD about developing such a system. Should you have any comments or questions on our analysis or desire to schedule a meeting to discuss it, please contact Christopher Grundler, Director, or Gordon Davidson, Deputy Director, of the Federal Facilities Hazardous Waste Compliance Office at FTS 475-9801.

Sincerely,

J. WINSTON PORTER,
Assistant Administrator.

Enclosure.

TECHNICAL ANALYSIS OF THE DEFENSE PRIORITY MODEL (DPM)

ANALYTIC APPROACH

The analytic approach followed in this review was primarily a critical evaluation of the individual factors in the DPM and logical operations by which these factors are combined into DPM scores. In addressing the adequacy of these component factors, we used two evaluation criteria. The primary criterion was whether the DPM is likely to accurately characterize relative threats from waste sites, which we assessed by comparing the factors and operational definitions with generally accepted risk assessment practice for waste sites. The secondary criterion was whether there are factors omitted from the model that could lead to inconsistencies or biases in the DPM's evaluation of relative threat for different types of DOD sites. These criteria were based on our understanding that the prinicipal goal of the DPM is to rank sites in a consistent and timely manner on the basis of the overall threats they pose to human health and the environment.

The principal information source for this technical review was the draft *DPM User's Manual* (DOD 1987). Also considered were results from EPA's testing of DPM's predecessor model, HARM II (IEc 1988). While some conclusions can be drawn from an examination of the DPM structure, the adequacy of the DPM cannot be demonstrated with assurance without testing it on individual sites after the RI/FS studies are completed.

In the section that follows, the major shortcomings of the DPM are highlighted. It is important to note that the shortcomings of the DPM that are discussed do not necessarily constitute an exhaustive list; however, they do represent our opinion about the more significant areas in which the DPM differs from generally accepted risk assessment practice.

FINDINGS

Section 1.0 presents the main findings of our technical review. We have organized the discussion of shortcomings into subsections corresponding to the model components. Section 1.1 presents an overview of the analysis. Section 1.2 addresses contaminant pathways. Section 1.3 discusses the contaminant hazard component. Section 1.4 analyzes the receptor characterization component. Section 2.0 summarizes our conclusions.

1.0 Technical Shortcomings of the DPM

1.1 Overall.—Excluding air and soil as contaminated media and, therefore, potential pathways for humans and ecological receptors, is a major omission of the DPM. **Experience has shown that at some EPA Superfund sites, the estimated risk from air pathways or from direct contact exposure is higher than from ground-water and surface water pathways. Furthermore, there is normally little or no time lag associated with air or direct contact exposures, unlike the typical case for ground water; contaminated air reaches receptors almost immediately.**

The DPM lacks consideration of the quantity of waste material at a site, which means that contaminant release magnitude and duration are not accounted for. Additionally, the DPM does not account for the mobility of contaminants, which is particularly important in ground-water, nor does it account for documented evidence of human exposure, if available. We believe that omission of factors addressing waste quantity, mobility, and evidence of human exposure are significant drawbacks of the model, particularly considering that these data are part of the RI/FS for many sites and available at the stage the DPM is to be used.

The final site score of the DPM is to be used as an indication of relative threat. However, the comparison of two final site scores may not readily demonstrate the difference in threat from different sites. For instance, the user's manual includes a sample evaluation of Myrtle Beach Air Force Base, South Carolina. According to this example, somewhere between 26 and 100 people live within 1,000 feet of the site; the final site score for this example is 12.8 out of a possible 100. If, however, the population within 1,000 feet was tenfold greater, i.e., between 260 and 1,000, *and all other factors remained the same,* the final site score would be 13.0. The magnitude of the increased potential threat is not made apparent by the difference between the two final site scores. In fact, if the population was a hundred times greater, the final site score would remain at 13.0, as the factor "population within 1,000 feet" reaches a maximum value of 3 at a population greater than 100.

1.2 Pathways.—This component rates the potential for contaminants from a site to be released and reach surface water or ground water. In cases of observed releases, the pathway score is maximized at 100. This procedure gives emphasis to sites experiencing releases and helps separate them from sites not having releases, but this procedure reduces the ability of the model to discriminate among several releasing sites. This may not support the purpose the DPM is intended to serve because many of the sites to which it would be applied are likely to have evidence of observed releases.

The limited scope of physical-geologic information used in determining the pathway subscore for sites without observed releases generally makes it difficult to incorporate information collected during the RI/FS process (with the possible exception of a refined estimate of surface permeability) which would provide a better assessment of release potential. Therefore, for sites without observed releases, this pathway subscore takes limited advantage of the type and amount of data likely to be available. The extensive data collection during the RI/FS (compared to a site inspection) does raise the probability of detecting a release if one has occurred, however, thereby increasing the number of sites receiving maximum scores in this subscore category, compounding the "inability to discriminate" problem.

1.3 Contaminant Hazard.—This component rates health and ecological hazards of identified contaminants by one of two methods, depending on whether or not there are observed releases from the site. Significant shortcomings of this component involve: (1) benchmarks; (2) use of concentration data; (3) summation of hazard quotients; (4) scoring scales; (5) use of bioaccumulation; and (6) inconsistency of the approach for pathways with and without observed releases. These shortcomings of the DPM are discussed below.

The DPM user's manual contains no description, rationale, or documentation for the health and ecological benchmarks that are key quantitative parameters for scoring contaminant hazard. There is only reference to an in-press document that is supposed to describe the methods used to derive benchmarks and provide citations for the values listed in Appendix B of the user's manual. At a minimum, the user's manual needs a summary of the methods and data sources used to develop benchmarks (possibly a single table). We believe this omission is a significant but readily correctable shortcoming of the model documentation, and it has resulted in us being unable to comment in detail on the benchmarks at this time. Based on a limited preliminary examination of Appendix B, however, it *appears that there are numerous inconsistencies between the human toxicity values listed for use in the DPM and the most recent values recommended for use in EPA's Superfund program,* i.e., values used and referenced in the U.S. EPA's Superfund Public Health Evaluation Manual (1986, plus updates of appendices) and values found in EPA's Integrated Risk Information System (IRIS).

The DPM depends completely on environmental concentration data as a means of assessing the magnitude of potential exposures; it *does not contain any factors, such as waste quantity at the site, related to duration of exposure.* As a result, the DPM at best assesses potential threats at the time of site sampling activities, without accounting for the possibility of significant future exposures (i.e., it is more of a "snapshot" assessment than an overall assessment). In fact, for sites not having observed releases, the DPM does not account for the potential magnitude or duration of exposure at all. Another potential model shortcoming related to use of concentration data is the lack of any linkage between the data used and actual or potential receptor locations. The model instructions are simply to use the highest concentration measured in either ground or surface water, while it may be more reasonable to use the data most relevant to receptor locations.

For sites with observed releases, the contaminant hazard score of the DPM is based entirely on the sum of the ratios of measured concentration to benchmark (referred to as hazard quotients) for all contaminants. Although we are not certain of the source of the health benchmarks, as described above, it appears that the benchmarks may represent fundamentally different types of thresholds (e.g., regulatory levels, reference levels for noncarcinogenic effects, risk-specific levels for cancer). If this is indeed the case, *summing* the ratios would yield values that are difficult to interpret in terms of risk significance.

For both human health and ecological hazard, the sums of the concentration/benchmark ratios are scored based on specified rating scales. If no observed release exists (i.e., no concentration data), then the benchmarks themselves are scored according to a different set of rating scales. There is no rationale given for the derivation of any of the four rating scales (health and ecological, for both observed release and no release situations), nor for how the scales relate to one another. Several apparent logical inconsistencies seem to exist. In some cases, scale categories correspond to single order-of-magnitude changes in benchmark or hazard quotient values, while in other cases they correspond to half or double order-of-magnitude changes. We see no apparent logic in this inconsistency, and it seems preferable to have scores reflect similar quantitative changes if possible. Also, exceedence of a human health benchmark gives a score of two, while exceedance of an ecological benchmark gives a score of three; without knowing exactly what the benchmarks represent and how they are derived, we cannot evaluate whether this relationship makes sense. In addition, three of the scales are based on 6 categories, while one is a 9 category scale, further complicating the issue of how the scales quantitatively relate to one another. Given that the DPM is to be used to help determine remedial action priorities *after* RI/FS risk assessment data is collected, a more sophisticated approach incorporating such data for determining the risk posed by released contaminants should be considered.

Based on the model instruction and the example provided in Appendix A.2 of the user's guide, it appears that assumptions about fish intake are always included in the calculation of the hazard quotient (concentration:benchmark ratio). We believe this is inappropriate for ground-water pathway scoring. A related criticism, for sites without observed releases, is the use of bioaccumulation factors as key determinants of the overall contaminant health hazard subscore. Unless there are exposure pathways, such as fish or crop ingestion, in which bioaccumulation may be a significant factor, bioaccumulation potential may result in a misrepresentation of the site threats. In particular, routinely including bioaccumulation potential in the health hazard score for ground-water pathways, as currently done in the DPM, is inappropriate. Because highly bioaccumulative chemicals are often relatively immobile in ground-water, high scores for this factor may be misleading because they will often be based on chemicals that are transported slowly in ground-water, if at all. It also seems inconsistent that bioaccumulation potential and fish ingestion are considered in the contaminant health hazard subscore but that receptor scoring is based primarily on drinking water exposures.

The use of different approaches for scoring contaminant hazard for pathways with and without observed releases may cause inconsistent rankings of these two classes of sites. Basically, for sites with observed releases, the contaminant hazard subscore is a surrogate for relative *risk* (i.e., it combines exposure and toxicity information) of all chemicals present. For sites without observed releases, this subscore is a surrogate for relative *hazard* (i.e., not based on exposure information) of the most toxic/bioaccumulative chemical. The way the scoring rules work, two sites that are identical except for detection of an observed release could easily get very different hazard subscores *and* the site with the release could get scored lower. For example, if chlordane was the only chemical for a ground-water pathway and it had been detected at eight times above its benchmark level, it would receive a health subscore of 2. However, if the same site had not yet released or a release had gone undetected, the health hazard subscore would be 7. This seems to be an unreasonable model outcome in that the presence of a release reduces the score.

1.4 Receptors.—This component rates the receptor characteristics for pathways. Major shortcomings of this component involve: (1) vague definition of factors; (2) possible inadequacy of accounting for future threats from releasing DOD facilities and

(3) inadequate use of data from the RI/FS. We discuss these categories of shortcomings in order below.

Documentation and rationale for the scales used to score factors in this model component were not provided and could not be analyzed. As an example of this, no guidance was provided in the DPM documentation concerning criteria that should be used to determine boundaries of contaminated areas. Consistent guidance is required because many of the factors depend heavily on distance and, given the scales used for receptor evaluation, different definitional criteria could result in substantial inconsistencies in the evaluation of human and ecological receptors.

A second problem concerns definition of the maximum distance for receptor evaluation for surface water pathways site which is three miles. Significant contamination in surface water pathways has been found more than three miles downstream from Superfund sites (MITRE 1986).

A third problem concerns the definitions used to evaluate ground-water pathways for human health receptors. The DPM does not consider ground-water use of deeper aquifers that, in some cases, may serve larger populations and result in greater total risk than contamination of smaller, shallow aquifers.

A fourth receptor definition problem is the ommission of population exposed by surface water recreational and food chain pathways. For some sites, food chain exposure routes may be as important as drinking water exposure.

Values for ground-water travel time to receptors are heavily weighted (the raw score is multiplied by either five or nine) in scoring ground-water pathway human receptors, with a considerable decrease in points assigned starting with five years. This scoring procedure results in the DPM substantially discounting receptors that are likely to be exposed in the future (i.e., reduction in factor score by two-thirds for travel times greater than 20 years). DOD may want to consider a procedure that accommodates the long-term and generational aspect of ground-water contamination, particularly in light of the longevity of the cleanup program. Furthermore, ground-water travel time is not really the most relevant variable; contaminant travel time in ground water is more directly related to threats from a site.

The water use factor only addresses present uses of both ground water and surface water. This presents two issues. First, if drinking water use has been discontinued recently because of surface water pollution, the DPM would score human use as zero if the water body is not used for other purposes. This is inconsistent with CERCLA/SARA Section 118 which requires that a high priority for remedial action be given for drinking water sources that have been closed or discontinued due to releases. Second, potential future water use is not considered in the DPM as the Myrtle Beach AFB example indicates. Planned drinking water use is an important category relative to characterizing long-term threat. Although it is difficult to assess planned water use in a model without potentially losing some consistency in scores, DOD may want to consider this factor as an element in the DPM.

The DPM does not account for direct evidence of human exposure that might be available for some sites after the RI/FS. This type of data is perhaps the best evidence of potential threats to human receptors available in the RI/FS, and information of this type was weighted very heavily by EPA's site ranking panel in their evaluation of test sites (IEc 1988). This critical and expensive-to-obtain data should be incorporated in any hazard, risk, or damage assessment when they are available as a result of RI/FS analyses.

SUMMARY AND CONCLUSIONS

Based on our technical review of the available DPM documentation, we believe that the current DPM may not rank uncontrolled hazardous waste sites by relative potential for causing health and environmental damage with sufficient accuracy. Given the number and importance of possible model deficiencies noted in Section 1, it would take strong empirical evidence of the DPM's performance on a sizable sample of actual waste sites to support a conclusion of technical adequacy as a relative threat model. The objective set out for the DPM to rank sites that have already been extensively studied and judged to need remedial action for initiation of cleanup activities, based on their potential to cause harm, is ambitious and may not be achievable using this model, which has certain inherent limitations as a risk assessment tool. It appears to be the wrong tool for its intended use. The consequences of misranking in this context could be significant in that the "wrong" sites would get cleaned up first, resulting in increased damages to health and the environment and possibly greater ultimate cleanup costs. Furthermore, there would be increasing uncertainty about when, if ever, sites ranked low would actually be addressed, given the potential for change in policies and future funding priorities. EPA does believe, however, that establishing a priority system for remedial actions is a laudable, if not difficult, goal. EPA will work with DOD on trying to establish such a system.

We believe the following findings of our technical review are most significant:

> The DPM documentation reviewed, primarily the user's manual, is inadequate to allow a comprehensive technical review. It is fairly clear in describing how to score a site using the model, but it provides almost no rationale or supporting documentation for the model components. All factors definitions, scoring scales, and algorithms need to be documented somewhere, preferably in a separate volume, and brief summaries of rationale would be useful in the user's manual. For example, no mention at all is made of the methods or data sources used to derive benchmarks, which are key parameters determining overall site scores.
>
> There are significant gaps in the factors considered in the DPM. Specifically, the DPM does not account at all for two demonstrably important classes of exposure pathways at uncontrolled waste sites—those involving releases to air and those involving direct contact exposures to wastes and contaminated soils. It does not account for contaminant mobility or documented evidence of human exposure, and its benchmark data base appears to be inconsistent with current approaches to assessing toxicity in EPA's Superfund program. The DPM also lacks any consideration of waste quantity, which is an important factor in assessing risk over time.
>
> Many, if not most of the sites to which the DPM will be applied, are likely to have observed releases. The DPM may not discriminate among these sites very well because all of them will receive identical maximum pathway subscores, with no consideration given to release frequency or duration and limited consideration to release magnitude. Such discrimination should be possible using RI/FS data.
>
> The DPM appears to be biased toward current threats over potential future threats, even if future threats are large. This, however, may be considered a nontechnical issue and may be fully consistent with DOD's purpose.
>
> The DPM does not take full advantage of the kinds of data generally available after a RI/FS, particularly the results of data analysis and evaluation done in the RI/FS including the risk assessment. Because of the structure of the DPM, few of the DPM input data elements would be enhanced by using RI/FS data instead of SI data, with the exceptions of ground-water flow direction and some environmental monitoring data. The DPM is similar to other site ranking models designed to use site inspection data, and may not perform measurably better using RI/FS data than would the other SI based models. For ranking sites in order of priority for remedial action, a model that uses RI/FS data more fully may do better than the DPM as it is currently structured.

REFERENCES

Department of Defense (DOD). 1987 (November). Defense Priority Model User's Manual, Draft. Office of the Deputy Assistant Secretary of Defense, The Pentagon, Washington, D.C.

Industrial Economics (IEc). Unpublished. Analysis of Alternatives to the Superfund Hazard Ranking System, Final still unpublished Draft. Prepared for the Office of Policy Analysis, U.S. EPA, Washington, D.C.

MITRE Corporation. 1986 (August) Hazard Ranking System Issue Analysis: Targets Distance Limit for Surface Water. Prepare for the Office of Emergency and Remedial Response, U.S. EPA, Washington, D.C.

U.S. Environmental Protection Agency. 1986. Superfund Public Health Evaluation Manual.

ENVIRONMENTAL CONDITIONS

Senator EXON. Mr. Diamond, what environmental conditions do you foresee that could force the closing of current DOE facilities or that could prevent the opening of important new waste repositories?

Mr. DIAMOND. Where a site poses an imminent and substantial endangerment to human health and the environment, the Environmental Protection Agency can take whatever action is necessary to abate such endangerment. Moreover, if necessary to protect human health and the environment, the Agency can require a facility to change its hazardous waste management practices in order to keep operating. It seems unlikely, however, that such actions would require an entire facility to close. It is anticipated that any new facilities will meet or exceed environmental standards.

HIGH LEVEL WASTE

Senator **Exon**. Mr. Diamond, DOE's 2010 Report states that "the single most significant issue facing the DOE's Waste Management Program is how current uncertainties in the definition of High Level Waste are resolved." DOE estimates that about ⅔ of the resources needed for waste management over the next two decades will be for High Level Nuclear Wastes, the most long-lived and dangerous type of waste. The current definition of High Level Waste is based on the original source of the waste—spent fuel reprocessing—rather than the actual risk of such waste to the environment and the public. This seems to require that large quantities of waste with relatively low levels of radioactivity from reprocessing may have to be disposed of in a geologic repository, such as the one we hope to build at Yucca mountain. Such disposal is the most expensive form of storing waste. However, the definition currently used to determine what is High Level Waste is not based on the *actual risk* to the environment and the public, but rather on the *source* of the waste. According to DOE, this "source definition" could result in additional costs as high as $80 billion. What is EPA's view on how high level wastes should be defined?

Mr. **Diamond**. In preparing its technical analysis for promulgating environmental standards for high-level radioactive waste disposal, EPA used the present definition in the Nuclear Waste Policy Act as interpreted by the Nuclear Regulatory Commission (NRC). It is EPA's understanding that the NRC is the sole Federal Agency with the legislative authority to change what waste falls in or out of this definition.

LOW LEVEL WASTE

Senator **Exon**. Mr. Diamond, DOE's 2010 Report states that "it is DOE's policy to maintain an equivalent of greater level of protection for the safety of the public and its employees from Low Level [Nuclear] Waste operations than that required of commercial waste generators, and to comply with all applicable environmental regulations and standards." In your view, is this policy being effectively implemented?

Mr. **Diamond**. DOE's waste handling practices over many years have resulted in problems which will require by all estimates billions of dollars to clean up. The Agency has noted a change in DOE practices during the last several years. Present DOE planning appears to be directed toward environmental requirements. The transition, however, will take time.

ENVIRONMENTAL RISKS

Senator **Exon**. Mr. Diamond, which DOE facilities, if any, are not currently in compliance with applicable environmental laws? What environmental risks are posed by noncompliance?

Mr. **Diamond**. EPA has reviewed the most recent data (3/89) entered into each of EPA's major program data information systems for the DOE weapons plant facilities. The information systems reviewed were the Compliance Data System (CDS) for air violations, the Permit Compliance System (PCS) for water (NPDES) violations and the Hazardous Waste Data Management System (HWDMS) for RCRA violations. In the air program, two of the listed DOE facilities were found to be in violation of the Clean Air Act—the Feed Material and Production Center, Fernald, Ohio and the Pinellas Plant, Florida. In the water (NPDES) program, the Fernald facility once again was in violation of the Clean Water Act, as well as the Los Alamos National Laboratory in New Mexico. The following DOE facilities are currently not in compliance with RCRA: Paducah Gaseous Diffusion Plant, Kentucky, Oak Ridge, Tennessee, Y-12 Plant Oak Ridge, Tennessee, Mound Facility, Ohio, Los Alamos National Laboratory, New Mexico, Sandia National Laboratory, New Mexico, Kansas City Plant, Missouri, Rocky Flats Plant, Colorado, Lawrence Livermore National Laboratory, California, Feed Material and Production Center, Ohio and Hanford, Washington.

Under RCRA, EPA classifies violations as either Class 1 or Class 2. All of the facilities listed above as not in compliance with RCRA have Class 1 violations in one or more of EPA's eight violation categories. A violation is labelled as Class 1 when it has the *potential* to result in a release of hazardous waste into the environment. The Agency considers a Class 1 violation and every act of noncompliance as a potential threat to the environment. The effect of noncompliance on the environmental may not occur tomorrow, but it will be predictably felt in the future. For example, under RCRA the facility must properly label drums of hazardous waste. Failure to do so may not result in a release today, but such failure might lead to improper mixing or improper disposal in the future.

CLEANUP STANDARDS

Senator EXON. Mr. Diamond, what is EPA's view on the appropriate role of economic considerations in determining cleanup standards?

Mr. DIAMOND. EPA is required by Section 121 of the Superfund Amendments and Reauthorization Act of 1986 (SARA) to consider cost in the selection of remedy process. SARA retains the original CERCLA mandates to select remedies that are protective of human health and the environment and that are *cost effective*. Although cost-effectiveness cannot be used to select a nonprotective remedy, this mandate does require EPA to evaluate closely the costs required to implement and maintain a remedy.

According to the proposed National Contingency Plan, a screening step may be conducted during the Feasibility Study (FS) in those situations where a wide array of alternatives are available. This screening step is taken in order to reduce the number of alternatives that will be analyzed in detail. The primary focus during screening is on identifying those alternatives that are clearly ineffective or unable to be implemented, or that are clearly inferior to other alternatives being considered in terms of their effectiveness, ability to be implemented, or cost. Cost generally will not be the sole reason for eliminating an alternative from further consideration at the screening phase. The primary function of cost at this point in the process is to help identify alternatives that provide levels of effectiveness similar to those of other options being considered, but at substantially higher cost. Cost can also be considered in conjunction with other factors to determine whether or not an option is likely to yield results in terms of ability to implement and effectiveness that are in proportion to its costs, relative to other alternatives under consideration. For example, cost may be considered along with the ability to implement to determine whether treatment of the principal threats posed by a large municipal landfill would be cost-effective and practicable, relative to other remedial options.

Detailed analysis is conducted during the FS to objectively assess the alternatives with respect to nine evaluation criteria that encompass statutory requirements and include other gauges of the overall feasibility and acceptability of remedial alternatives. This analysis is comprised of an individual assessment of the alternatives against each criterion and a comparative analysis designed to determine the relative advantages and disadvantages between them. Cost is one of the nine criteria. Cost includes all construction and operation and maintenance costs incurred over the life of the project. The focus during the detailed analysis is on the net present value of these costs. A more complete discussion of the Remedial Investigation/Feasibility Study and selection of remedy process can be found at 53 Federal Register section 51424.

ENVIRONMENTAL CLEANUP

Senator EXON. Mr. Diamond, please explain what site-specific circumstances determine the governing legal authority for environmental cleanup at a particular facility. How are actual cleanup efforts affected by the choice of legal authorities?

Mr. DIAMOND. There are several primary site-specific circumstances determining the governing legal authority at a site. The first circumstance concerns the type of contamination at the site PCBs, radionuclides, or some sort of commercial chemical product? Many of the environmental statutes are designed to address distinct substances. For example, at the various DOE facilities, EPA will most likely be using its RCRA and CERCLA authority to address contamination at the facilities. This is because DOE facilities treat, store, or dispose of hazardous waste; therefore, RCRA, including the cleanup provisions, applies. RCRA, however, lacks jurisdiction to address radionuclides. As a result, the Agency will be using its CERCLA authority to remediate such contamination.

The second circumstance concerns whether or not the facility is listed or will be listed on the National Priorities List (NPL). Once a Federal facility is placed on the NPL, the statutory process of CERCLA determines what will occur at that particular NPL site within specified deadlines. The use of CERCLA does not rule out the operation of other legal authorities at the facility, however. For instance, a CERCLA cleanup does not exempt the Federal facility from obtaining a RCRA hazardous waste management permit for practices which would occur independently of the remedy.

ENFORCEMENT ACTIONS

Senator EXON. Mr. Diamond, what enforcement actions is EPA empowered to take against DOE or its contractors and does EPA find its present authority sufficient? Does EPA support legislation that has been introduced in the House to allow EPA to bring an administrative enforcement action against DOE and to waive the sovereign immunity?

Mr. **Diamond**. Agency policy, with the support of the Department of Justice, is that EPA can use its full range of authorities against a contractor that manages a DOE facility's hazardous waste. EPA has used this authority against government contractors in the past, most recently at the Feed Material Production Center for violations of RCRA. Our authorities to take enforcement action against contractors are the same as against any other persons.

The Agency supports the substitute bill adopted by the Subcommittee on Hazardous Materials and Transportation (HR 1056) on May 23, 1989.

CLEANUP PRIORITIES

Senator **Exon**. Mr. Diamond, in your prepared testimony, you state that cleanup "priorities are established within the agreements based on the relative threats to human health and the environment *as EPA develops these comprehensive IAGs with DOE and the states.*" What mechanism exists to ensure a consistent set of priorities is applied *across* the board?

Mr. **Diamond**. The Federal Facilities Hazardous Waste Compliance Office (FFHWCO) within the Office of Waste Programs Enforcement oversees the development of these Agreements. One of the missions of the FFHWCO is to ensure national consistency in the Agreements. Due to the close working relationship between Headquarters EPA and the Regions, the FFHWCO is in a position to guide the Regions towards a consistent approach.

FEDERAL BUDGET PROCESS

Senator **Exon**. Mr. Diamond, how, if at all, is the Federal budget process considered when EPA, DOE, and the states negotiate a cleanup agreement?

Mr. **Diamond**. In the model language negotiated with the Departments of Defense and Energy, there is a funding clause. EPA expects every Interagency Agreement to have such a clause. The clause references the requirement in Section 120(e)(5) of CERCLA, 42 U.S.C. Section 9620, that the Federal facility include in its annual report to Congress the specific cost estimates and budgetary proposals associated with carrying out the Interagency Agreement.

The funding clause acknowledges the constraints of the Anti-Deficiency Act. Moreover, the Agency understands that any obligation found in the Agreement is subject to the availability of appropriated funds.

TECHNOLOGY EVALUATION PROGRAM

Senator **Exon**. Mr. Diamond, your statement indicates that EPA has a technology evaluation program to demonstrate cleanup technologies. Admiral Watkins has announced a major DOE effort in this area. How, if at all, do the two agencies work together in this area?

Mr. **Diamond**. On April 27, 1989, Mr. Timothy Oppelt of EPA testified before the House Subcommittee on Natural Resources, Agricultural Research, and Environment of the Committee on Science and Technology. In his testimoney, Mr. Oppelt addresses your question at length (enclosure 2).

Enclosure 2

Testimony of E. Timothy Oppelt, Director, Risk Reduction Engineering Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH

Good morning, I am E. Timothy Oppelt, Director of EPA's Risk Reduction Engineering Laboratory in Cincinnati, Ohio. I would like to briefly describe for you this morning some of the coordination we maintain with the Department of Energy (DOE) on hazardous waste cleanup technologies generally, some of the EPA research and demonstration activities related to radioactive waste, and recent efforts to work jointly with DOE on this subject. I will confine my remarks to research, development and demonstration (RD&D) of cleanup technologies. We have others here from EPA who can answer questions about the management of the Superfund cleanup process and cleanup of Federal facilities.

EPA uses a wide range of cleanup technologies for remediation of hazardous waste sites. However, EPA is actively seeking and promoting the development and use of more cost effective and permanent cleanup technologies. One major program is the Superfund Innovative Technology Evaluation (SITE) Program. This program was mandated by the Superfund Amendments and Reauthorization Act of 1986 to encourage development and use of innovative technologies at Superfund sites through cooperative demonstrations between technology developers and EPA. The SITE program is now in its third year and has resulted in 10 field demonstrations to date with 18 others anticipated over the next eighteen months. EPA anticipates issuing shortly its second Report to Congress covering the program's progress and accomplishments through 1988.

We are encouraged by the private sector's response to the SITE program and its willingness to develop more cost effective cleanup technologies. We think some of these new technologies will prove to be valuable additions to our arsenal of Superfund cleanup weapons.

Since 1980, EPA and the Department of Defense (DOD) have been meeting formally in an Interagency Work Group on Hazardous Waste Technologies. In 1986 this Work Group was expanded to include the Department of Energy. The most recent Work Group meeting was in June 1988. The purpose of the Work Group is to share information, discuss ongoing hazardous waste RD&D projects, and identify areas for cooperative research.

In December 1986 the group published its second *Report of DOD/EPA/DOE Working Group to Explore Hazardous Waste Technology Cooperative Efforts.* The third edition of this document, which is based on the June 1988 meeting, has just gone to press. Projects listed are subject to ongoing discussions at these meetings. As a result of this Work Group, EPA, DOD, and DOE have developed a number of co-funded projects. EPA and DOE have also co-funded the incorporation of an EPA incineration database into a DOE hazardous waste database maintained at the Oak Ridge National Laboratories (ORNL).

Turning now to radioactive waste, in August 1988 EPA published a report on *Technical Approaches to the Cleanup of Radiologically Contaminated Superfund Sites.* This report was the result of a Congressional request to see what technologies might be available for eventual use to remediate Superfund radiation sites. In this report we attempted to do three things. First, identify the Superfund radiation sites; second, systematically review the full range of possible cleanup technologies for contaminated soils; and third, briefly describe some of the relevant DOE cleanup programs.

At the time the report was prepared, there were twenty proposed or listed National Priorities List (NPL) sites containing radioactive wastes. There are currently twenty-five sites of which six are DOE facilities. The sites involve a wide range of contaminated media, types of toxic and radioactive waste, and size (less than 50 cubic yards to over 16 million cubic yards).

The August report reviewed the state of the art of the following types of remediation technologies: on-site disposal, off-site disposal, on-site treatment, radon control, chemical extraction, physical separation, and combined physical separation and chemical extraction. This review had input from EPA's Office of Emergency and Remedial Response (Superfund), EPA's Office of Radiation Programs, all 10 EPA Regional Offices, as well as the Department of Energy.

Based on this review, a number of conclusions were reached. The following are some of the conclusions regarding technological approaches:

> Alteration or remediation of the radioactive decay process, thus changing the fundamental radioactive hazard, is not possible.
>
> Remediation, to date, has involved only removing contaminated material and containing it in above-ground land encapsulation, drums, or temporary storage sites.
>
> Alternative treatment technologies that may warrant further study include solidification, vitrification, chemical extraction, physical separation, and combinations of physical separation and chemical extraction. However, even for these treatment technologies some form of containment or disposal of radioactive residual would always be needed.
>
> Various remediation technologies may have the potential to reduce the volume of contaminated waste with an associated increase in the concentration of the radioactive material.
>
> Remediation technologies generally result in the disturbance of contaminated material. This often involves risk to human health and the environment which must be weighed against leaving the contaminated materials on-site in a contained state.

The DOE programs summarized in the report include the Formerly Utilized Sites Remedial Action Project (FUSRAP), Surplus Facilities Management Program (SFMP), Uranium Mill Tailings Remedial Action Project (UMTRAP) and Grand Junction Remedial Action Project.

In December 1988 EPA published the interim final draft of an *Assessment of Technologies for the Remediation of Radioactivity Contaminated Superfund Sites.* The final draft of this report will be published in June 1989. The December report categorized the 25 NPL radiation sites and their problems, developed criteria for rating technologies, identified promising technologies based on those ratings, and made recommendations for research, development and demonstration. We are currently gathering additional documentation for the final draft of the report.

The December report categorizes Superfund radiation sites according to the nature of the contaminated materials at the site (soils, water and/or structures) and of the contaminants (radium, thorium and/or uranium; other radionuclides—e.g., plutonium; and mixed radioactive and hazardous waste). So, for example, of the 25 sites, 23 have soil contaminated with radium, thorium, and/or uranium; 20 have water contaminated with these elements, 11 have soil contaminated with mixed waste, and many of the sites have multiple problems.

Two sets of criteria were developed to rate new cleanup technologies. These criteria are based on the mandates and preferences under the Superfund law. First, there are two performance criteria. One rates the long-term reliability of the treatment process. The other rates the effectiveness of the technology in reducing the toxicity, mobility, or volume of the waste. There are also two developmental criteria. One rates the stage of research and development; the other rates the available information on the state of development.

Promising technologies were defined as having the highest performance scores for application with each type of contaminated material and containment group. For example, there are 11 promising technologies for cleanup of soils contaminated with radium, thorium and/or uranium, but only one promising technology for cleanup of water contaminated with mixed waste.

These two report have given EPA a good basis for deciding on priorities for research, development, and demonstrations of radiation cleanup technologies.

We are now moving toward demonstrating and evaluating some of these technologies under the SITE program. In one SITE project Retech, Inc. has developed a thermal treatment centrifugal reactor that uses plasma heat to decompose organic compounds and immobilize heavy metals into glass-type waste. A DOE facility in Butte, Montana, is being considered as a demonstration site for this technology. EPA will evaluate the first month of operation and DOE plans to carry out an additional six months of testing. While radioactive wastes will not be tested, some are similar to the hazardous wastes that will be tested.

In another SITE project EPA hopes to demonstrate a technology developed by the DOE Battelle Pacific Northwest Laboratory and marketed by Geosafe Corporation. The technology is an in-situ vitrification (ISV) process that thermally destroys organic constituents and converts contaminated soil or sludge into a glass and crystalline product. We are currently evaluating several sites for demonstration of this technology.

We have attempted through the SITE program to solicit interest from the private sector to demonstrate technologies specifically for radiation cleanup. In one case, we entered into a joint agreement with the State of New Jersey to demonstrate the cleanup of radioactively contaminated soils. We are currently working with New Jersey to solicit private sector interest in this program.

EPA's Office of Radiation Programs (ORP) has been experimenting in the laboratory with four treatment processes that promise to clean radioactively contaminated soils to acceptable levels. The radioactive materials would be concentrated in a smaller volume for efficient storage, disposal, or further treatment. Initial results with physical separation and soil washing techniques have been very encouraging and we are planning a pilot plant test. Additionally, ORP is experimenting with chemical extraction and magnetic separation techniques that may further reduce the volume of contaminated material.

At a recent meeting with the DOE Office of Defense Waste and Transportation Management we shared information on our mixed waste RD&D efforts and discussed the possibilities for cooperative research and demonstration projects. We believe that there may be opportunities for additional joint demonstrations under the SITE program and for sharing of information and data from our respective RD&D programs. We will be discussing further these opportunities with DOE in the near future. Given DOE's responsibilities for cleanup of radioactively-contaminated sites, it makes sense to pool our expertise and work cooperatively in RD&D of cleanup technologies.

EPA also attacks the hazardous waste problem from the direction of pollution prevention or waste minimization, specifically, from the perspective of either eliminating waste generation or else recycling it. With this approach there are no wastes to be managed—a clearly preferable option. We believe there are many waste minimization opportunities available, as exemplified by the successful waste minimization projects of several large companies. Similar opportunities probably exist in the radioactive waste minimization program area as well. EPA is planning several waste minimization technology research and demonstration projects. Parts of this program focuses on cooperative technology demonstration programs with other Federal agencies. We look forward to working with DOE to explore the potential for cooperative projects involving wastes generated from their facilities.

I appreciate the opportunity to discuss our activities with you, and will be glad to answer any questions you may have.

COMPLYING WITH ENVIRONMENTAL LAWS

Senator EXON. Mr. Diamond, how does EPA presently ensure that DOE complies with applicable environmental laws? What means are available to EPA to force DOE or other Federal agencies to comply with environmental laws?

Mr. DIAMOND. If a facility generates, treats, stores, or disposes of a hazardous waste, that facility is under the aegis of the RCRA regulatory and enforcement program. The implications of being regulated under RCRA are that RCRA inspectors (EPA and state) perform annual inspections as required by law, the facility is required to track its waste by means of self-reporting, and the facility has to meet other RCRA requirements. The inspections, the self-reporting, and the meeting of other requirements enables EPA and the states to regulate Federal facility compliance with RCRA.

Once the Agency discover RCRA violations at a Federal facility, EPA or the state will enforce the RCRA requirements by taking action against either DOE or the contract operator (GOCO). The Federal Facilities Hazardous Waste Compliance Office is presently developing policies to speed the process of negotiating these Federal Facility Compliance Agreements, and is participating in an EPA-wide effort to develop a GOCO enforcement strategy.

In the realm of CERCLA, placing a facility on the National Priorities List triggers a series of statutory deadlines for the investigation and cleanup of DOE facilities. Through the negotiation and oversight of CERCLA Section 120 Interagency Agreements (IAGs), EPA ensures that the Federal facility performs whatever tasks are required by specified deadlines. If DOE fails to comply with these IAGs, states and citizens are empowered to enforce the agreements. In addition, EPA can assess penalties for a Federal facility's failure to comply with the terms of the IAG. Finally, CERCLA Section 103 mandates that a Federal facility report to the National Response Center anytime there is a release of a hazardous substance.

Other environmental laws, likewise, require the performance of inspections which inform the Agency whether or not the Federal facility is in compliance with that particular environmental law. If the Agency discovers that the particular Federal facility is out of compliance, EPA will negotiate a compliance agreement or consent order which will require a schedule for returning the Federal facility to compliance.

There are similar mechanisms for ensuring Federal facility compliance with other applicable environmental laws such as the Toxic Substances Control Act, the Clean Water Act, and the Clean Air Act. Furthermore, environmental laws generally require permits for various functions of the Federal facility. This permit requirement gives the Agency some control over how the Federal facility operates. Conditioning the granting of the permit on meeting the requirements of these various statutes creates incentives to ensure that Federal facilities comply with the law.

AMENDING SOLID WASTE DISPOSAL ACT

Senator EXON. Mr. Diamond, legislation has been introduced in the House to amend the Solid Waste Disposal Act to waive sovereign immunity of the Federal Government for purposes of enforcing this act. This would allow states to impose civil penalties on DOE which would have to be paid out of authorized funds, for violations of state hazardous waste laws. Does EPA view the imposition of penalties and sanctions by the states as an effectual deterrent to Federal facility compliance with RCRA and state hazardous waste laws?

Mr. DIAMOND. EPA historically has relied with some success upon penalties and sanctions to create incentives for private facilities and other non-Federal governmental facilities to comply with environmental laws. There is no reason to believe that a Federal agency would behave differently than a private facility if it were subject to similar penalties or sanctions.

NO-MIGRATION VARIANCE PETITION

Senator EXON. Mr. Diamond, on March 3, 1989, DOE applied for a no-migration variance petition under the Resource Conservation and Recovery Act for the Waste Isolation Pilot Plant in New Mexico. Is there any reason EPA would not be able to act on this petition within six months? If so, please provide a detailed explanation.

Mr. DIAMOND. EPA sent a letter to Secretary James Watkins estimating that EPA would be able to make a tentative determination on the petition by November 1989 (*see*, enclosure 3).

ENCLOSURE 3

U.S. ENVIRONMENTAL PROTECTION AGENCY,
THE ADMINISTRATOR,
Washington, DC, May 18, 1989.

Hon. JAMES D. WATKINS,
Admiral, U.S. Navy (Ret.),
Secretary, Department of Energy,
Washington, DC.

DEAR JIM: I want to respond to your letter of April 4, 1989, as well as your note of April 27, 1989, regarding the need for the Environmental Protection Agency's (EPA) expedited review of DOE's "no migration" petition for the Waste Isolation Pilot Plant Project (WIPP) in New Mexico. I can assure you that the review is receiving the highest priority within EPA. To expedite this review we have formed a special task force of experienced staff, who will be devoting full time to the project until its completion.

This job is a highly complex undertaking with several points at which our best, most expeditious efforts could be sidetracked. Because the WIPP petition will be EPA's first no-migration decision, it will be precedential. Final regulations for no-migration petitions are not yet in place and thus, EPA will have to rely on draft procedures. "No-migration" variances must be issued through rulemaking procedures which means that we must publish our proposed decision in the Federal Register, allow time for public comment, and consider that record before we can make the decision final.

As you well know, EPA's decision on this petition is of intense interest to many constituencies. As a consequence, our process and technical conclusions must be able to withstand public and possibly even judicial review. We expect that with a high priority, focussed approach, EPA at best will be able to make a tentative determination on the petition by November 1989.

Staff in EPA's Offices of Solid Waste and Radiation Programs are now reviewing DOE's petition and have identified several areas where we will require further information or explanation. They are working now with your staff to obtain this information.

I welcome your offer of technical support and dollars for our review of the petition. As I mentioned, EPA is now committing a significant level of resources to this review. Since DOE is the petitioner, we are unable to use DOE staff to assess, process or otherwise provide technical support on the no-migration petition. This would pose conflict of interest problems. However, there are forms of assistance from DOE that would be appropriate, would help ensure that the review can continue to receive the highest priority, and would be much appreciated by the Agency. Specifically, EPA would welcome a transfer of approximately three full-time equivalents (FTE's) for the remainder of fiscal year 1989 and for fiscal year 1990, to support the personnel we have assigned to our WIPP task force, and $500,000 reimbursement for our contractor support; these resources would help offset EPA's recent reprogramming of resources to this unbudgeted project.

Please let me know if you have any questions on this important project, or on our approach to the review of your petition. I look forward to your continuing cooperation on this matter.

Sincerely yours,

WILLIAM K. REILLY.

QUESTIONS SUBMITTED BY SENATOR STROM THURMOND

COMPLIANCE AGREEMENTS

Senator THURMOND. Mr. Wade, in your statement, you indicated that it is the Department's policy to assure compliance with all applicable State and Federal requirements. To this end, is the Department still seeking to enter into compliance agreements with the States and the Environmental Protection Agency?

Mr. WADE. The Department of Energy is firmly committed to environmental compliance and cleanup at its facilities. The Department is currently negotiating a number of compliance agreements with Federal and state agencies and will continue to initiate negotiations for agreements in the future. The Department is currently developing an Environmental Restoration and Waste Management 5-Year Plan, which will be available in draft in August 1989, to characterize and prioritize all waste cleanup activities at DOE sites. This 5-year plan will be used in part to reaffirm fiscal year 1990 programs and provide a baseline for fiscal year 1991 and outyear budget requests. It is the Department's policy to review proposed agreements before commitments are made to ensure that the agreements are consistent with the 5-year plan and compatible with the priorities established.

SCHEDULES FOR CORRECTIVE ACTIONS

Senator THURMOND. Mr. Wade and Mr. Berube, do the compliance agreements that you are making with the States and the EPA establish schedules for corrective actions which effectively establish priorities for available funding?

Mr. WADE and Mr. BERUBE. Compliance agreements executed to date have established schedules for corrective actions that the Department has been able to adequately fund. The Department has recently begun to negotiate long-term agreements for environmental cleanup at its facilities. To consolidate, characterize and prioritize the Department's cleanup activities, Secretary Watkins initiated the preparation of an Environmental Restoration and Waste Management 5-Year Plan. It is the Department's policy to negotiate compliance agreements that are consistent with the 5-year plan and compatible with risk-based priorities established in the plan.

CLEANUP PRIORITIES

Senator THURMOND. Mr. Wade and Mr. Berube. How do you reconcile compliance agreements with the process of establishing cleanup priorities for the weapons production complex as a whole?

Mr. WADE and Mr. BERUBE. The Department is now preparing an integrated 5-year plan to identify and prioritize all cleanup activities at DOW sites, including the weapons production complex. A final draft of the plan will be completed in August 1989, consolidating all environmental restoration, corrective action, and waste management activities into a single, integrated plan of action. Any currently proposed environmental compliance agreements will be reviewed before commitments are made so that these draft agreements will be consistent with the 5-year plan. Future compliance agreements will be consistent with our 5-year plan and compatible with the Departmental priorities established.

ENVIRONMENTAL SURVEY REPORT

Senator THURMOND. It has been alleged that the findings in the Environmental Survey report were, in some cases, not based on a thorough analysis of requirements. How would you characterize the process that produced this report?

Mr. WADE and Mr. BERUBE. The allegation in question was made by a staff member from the Natural Resources Defense Council (NRDC) who had previously worked on the Survey as a consultant. That individual suggested that ranking of Survey findings was in some cases based on data that were "made up." The validity of the findings themselves was not challenged by the NRDC.

The NRDC testimony focused on the data used in the computer-based ranking model to prioritize environmental problems identified by the Survey program. The data in question are quantitative characteristics of the sources of environmental contamination and/or the environment into which the problem contaminants might be released. The technical validity, substance, and accuracy of the findings from the Survey were not questioned by the NRDC.

The DOE ranking is based on the best information available. The Environmental Survey Program includes the use of a computer model, the Multimedia Environmental Pollutant Assessment System (MEPAS), that generates a ranking of environmental problems based on their potential for public health impacts. The environmental information used to run the model was either measured environmental data or technically based assumptions where no reliable quantitative information existed. The assumptions used in the model were developed by the Survey team members whose technical expertise and review of existing information on site operations and environmental setting enabled them to make reasonable estimates of environmental data.

The ranking process included a number of checks on the data and assumptions that were used in the rankings. These checks were designed to ensure that the data represented the best data available and that the conservative, but realistic, assumptions were technically sound.

CLEANUP ACTIVITIES

Senator THURMOND. Thus far in our hearings, there seems to be a general consensus that cleanup activities would benefit more this year from the establishment of a rational planning process than from a large infusion of funding over and above the amount requested in fiscal year 1990. What are your views on the level of funding for fiscal year 1990 cleanup activities.

Mr. WADE and Mr. BERUBE. The Department has initiated the preparation of an integrated 5-year plan that characterizes and prioritizes all cleanup activities at DOE sites. This comprehensive plan will encompass defense waste management operations, inactive waste site cleanup, and corrective actions needed for all DOE operating facilities.

A final draft of the 5-year plan will be completed in August 1989. This plan will consolidate all DOE cleanup activities into a single, integrated action plan. The plan will also be used to reaffirm fiscal year 1990 activities as well as to serve as a baseline for fiscal year 1991 programs and budget requests.

INTERAGENCY AGREEMENTS

Senator THURMOND. Mr. Diamond and Mr. Grundler, do you have any concerns that the interagency agreements that have been concluded may prejudge a rational priority setting and resource allocation plan for the Department of Energy Complex as a whole?

Mr. DIAMOND and Mr. GRUNDLER. The priorities for cleanup at Federal facilities are currently driven by deadlines established by statute. As detailed in CERCLA Section 120(e), a Federal facility must commence a Remedial Investigation/Feasibility Study within six months of listing on the National Priorities List. Physical onsite remedial action must commence within 15 months after the completion of the investigation and study. Schedules for the implementation of RCRA corrective action are driven by the statutory deadlines for permit issuance.

As EPA develops these comprehensive Interagency Agreements (IAGs) with DOE and the states, priorities are established within the agreements based on the relative threats to human health and the environment. Areas of contamination determined to represent higher threats are investigated ~~or~~ addressed by an expedited cleanup response first, while areas which do not represent as great a threat to the environment are scheduled for investigation later.

EPA does not believe these IAGs will prejudge any rational priority scheme for the cleanup of Federal facilities given that most facilities are still in the investigation phase. Planning for the resources to conduct the actual cleanups at Federal facilities will require a rational process for determining priorities. Development of this process must start now. Along with assessing the risk to human health and environment, the process must try to reconcile the statutory requirements for action provided in RCRA and CERCLA with the constraints of the Federal Budget process. EPA looks forward to working with DOE, the Congress and others to solve this national problem.

INTERIM ACTIONS AT SAVANNAH RIVER PLANT

Senator THURMOND. Mr. Diamond and Mr. Grundler, is the EPA satisfied with the progress of interim actions at the Savannah River Plant, particularly with regard to control of contaminated groundwater?

Mr. DIAMOND and Mr. GRUNDLER. Overall, the Agency is satisfied with the progress of interim actions at the Savannah River Plant. Three examples of such interim actions are as follows:

1. The Savannah River Plant has begun corrective action on the groundwater on some portions of the facility;
2. The Savannah River Plant excavated and boxed the contaminated soil contained in its "Chemicals Meals and Pesticides Pits" in order to prevent further groundwater contamination from these pits; and
3. Savannah River Plant has installed numerous groundwater monitoring wells around many of its solid waste management units.

Further measures are recommended for the protection of groundwater at Savannah River. For example, the Agency is concerned about the chlorocarbon contamination in the A/M area, for which the Savannah River Plant has already begun corrective action for groundwater contamination pursuant to the RCRA permit. However, the corrective action now underway is not adequately addressing the problem. The chlorocarbon plume is expanding and moving closer to the city of Jackson, South Carolina which uses groundwater for its drinking water. Additional groundwater withdrawal wells need to be installed and/or other activities (e.g., soil gas extraction) need to be undertaken to halt the spread of this contamination. DOE has shown some initiative in this area by testing a pilot scale soil gas extraction system, and by installing additional monitoring wells.

Questions Submitted by Senator Slade Gorton

HANFORD AGREEMENT

Senator GORTON. As you know, the Hanford Federal Facility Agreement and Consent Order (the so-called "triparty agreement") has recently been signed by DOE, EPA and my State Department of Ecology. This agreement sets schedules and funding targets to cleanup the Hanford site.

(a) Do you believe this agreement can serve as a model for other DOE sites across the country?

Mr. BERUBE. The Hanford Agreement is a three-party agreement that integrates activities required under both the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA) and the Resource Conservation and Recovery Act, as amended (RCRA). The agreement incorporates a strong state role and is based on the model provisions developed for interagency agreements required under CERCLA Section 120. The Hanford agreement demonstrates that the model provisions and the concept of full integration of RCRA and CERCLA requirements can be implemented through three-party agreements for complex DOE sites.

ENVIRONMENTAL RESTORATION PLAN

Senator GORTON. (b) What commitments do we have from the administration that the $2.8 billion needed over the next 5 years will be included in future budget requests?

(c) Since this tri-party agreement does *not* provide and automatic entitlement to $2.8 billion in funding, how does the administration plan to work with us and the Appropriation Committees to secure sufficient funding?

(d) It is not the intent of this agreement to force cuts in other DOE programs. What assurances do we have that the administration will be requesting *additional* sums to pay for the tri-party agreement, and not recommending cuts elsewhere in the DOE complex?

Mr. BERUBE. DOE is currently preparing a comprehensive Environmental Restoration and Waste Management 5-Year Plan which will encompass waste management operations, inactive waste site cleanup, and corrective actions needed at all DOE operating facilities. A final draft of this plan will be provided to the Congress in August. This plan will be used to help formulate the fiscal year 1991 budget request. The funding requirements under the Hanford tri-party agreement will be addressed for each year of the 5-year plan, and the plan will serve as a basis for working with Congress to assure that the funding commitments are addressed.

HANFORD WASTE VITRIFICATION PLANT

Senator GORTON. The Hanford Waste Vitrification Plan is the "flag-ship" program for cleaning up Hanford's defense waste. Yet, the funding profile recommended in the fiscal year 1990 Reagan administration request will result in an 18-month slip in construction completion of the Vitrification Plant. Will the funding increases recommended in the new Bush administration request eliminate this 18-month slippage?

Mr. BERUBE. The funding profile recommended in the fiscal year 1990 budget request supports a 1999 startup of the facility which is consistent with the Tri-Party Agreement.

Senator GORTON. Given the funding increases in the new Bush request plus the additional $30 million reprogrammed in fiscal year 1989 from unobligated balances, what are the prospects for accelerating the construction schedule for the Hanford Waste Vitrification Plant?

Mr. **Berube**. The Department is moving as expeditiously as practical toward the disposal of high-level waste, but DOE is unable to accelerate its HWVP construction schedule because of the need to complete safety analysis documentation, to upgrade pretreatment facilities, and to complete waste form qualification testing. Based upon these requirements we did not request additional funding to accelerate the HWVP schedule in the fiscal year 1990 budget request.

CLEANUP DOE'S DEFENSE PRODUCTION SITES

Senator **Gorton**. We all recognize that substantial sums must be spent over the next 30 years or more to cleanup DOE's defense production sites—sites that have made valuable contributions to enhancing our national security. It would be grossly unfair, in my view, to cut important operating facilities at these sites in order to fund the necessary cleanup activities. In recognition of the sacrifices these sites have already made to our country's defense, it ought to be the obligation of the Federal Government to fund cleanup *without* jeopardizing these sites' other operating programs. I trust that these are also the views of the administration?

Mr. **Berube**. The administration and Congress are presented with the challenge to work together to resolve the cleanup problems while assuring that the national security mission continues to be achieved. The Department's Environmental Restoration and Waste Management 5-Year Plan will be used to reaffirm fiscal year 1990 activities as well as serve as a baseline for fiscal year 1991 programs and budget requests. To the maximum strength possible, the planning effort is designed to ensure proper priorities are established so that environmental commitments are met without jeopardizing important operating programs.

[Whereupon, at 10:31 a.m., the subcommittee adjourned.]

SAFETY, MODERNIZATION, AND ENVIRONMENTAL CLEANUP OF THE U.S. NUCLEAR WEAPONS COMPLEX

FRIDAY, APRIL 7, 1989

U.S. Senate,
Subcommittee on Strategic Forces
and Nuclear Deterrence,
Committee on Armed Services,
Washington, DC.

ENVIRONMENTAL PRIORITIES FOR THE NUCLEAR WEAPONS COMPLEX

The subcommittee met, pursuant to notice, at 9:04 a.m. in room SR-222, Russell Senate Office Building, Senator J. James Exon (chairman of the subcommittee) presiding.

Committee members present: Senators Exon, Levin, Kennedy, Glenn, Wirth, Thurmond, Cohen, and Gorton.

Professional staff members present: Robert E. Bayer, Sherri W. Goodman.

Minority staff members present: Robert F. Bott and George W. Lauffer, professional staff members.

Staff assistants present: Tiffany E. Berger and Mickie Jan Wise.

Committee members' assistants present: Jeffrey B. Subko, assistant to Senator Exon; William J. Lynn, and Christopher E. Paine, assistants to Senator Kennedy; Milton D. Beach, assistant to Senator Glenn; Kevin T. Knobloch, assistant to Senator Wirth; James M. Bodner, assistant to Senator Cohen; and Robert M. Soofer, assistant to Senator Gorton.

OPENING STATEMENT OF SENATOR J. JAMES EXON, CHAIRMAN

Senator **Exon**. The subcommittee will please come to order.

This morning the subcommittee continues its series of hearings on the safety, modernization and environmental cleanup of the Nation's Nuclear Weapons Complex. This is the second of two hearings on the environmental priorities for the Nuclear Weapons Complex.

Yesterday the committee received testimony from the Department of Energy and the Environmental Protection Agency. The Department of Energy presented Admiral Watkins' intent to prepare an integrated 5-year cleanup plan to characterize and prioritize the waste cleanup activity that the DOE cites.

The Environmental Protection Agency indicated that three cleanup agreements have already been signed concerning DOE defense facilities and that eight or nine more are expected to be signed this year.

These agreements plus the integrated plan Admiral Watkins will prepare are finally beginning to come along and move us in the direction of a conprehensive integrated approach to the cleanup. Much work remains to be done, however.

The problems of cleaning up DOE defense facilities will be with us for many years. One of the issues explored during yesterday's hearings was whether additional funds could be productively utilized for cleanup activities during the fiscal years 1990 and 1991. There has been much interest in devoting additional resources to cleanup in the hopes of accelerating the process.

I have supported such increases when additional funds could be effectively and productively utilized. I hope today's witnesses will share their views with us on this subject and, if they support additional funding for cleanup in the near term, indicate specifically how it should be allocated.

The long-term issue that I hope will be addressed today is establishing priorities that can guide our cleanup program over many years. I am quite interested in the contribution our witnesses can make to this important subject.

Senator Thurmond has submitted his statement for the record which I shall include at this point.

[The prepared statement of Senator Thurmond follows:]

PREPARED STATEMENT OF SENATOR STROM THURMOND

I join you, Mr. Chairman, in welcoming our two panels to the subcommittee this morning. Today's testimony will add to the substantial record we are building under your leadership to deal with the critical national security, and safety and environmental issues in the nuclear weapons production complex.

This committee has long been committed to the national security imperative represented in our ability to support nuclear deterrence, and understands these issues. While the Committee claims no special expertise in the technical aspects of the safety and environmental issues that we now confront, we share a strong concern about these issues. It is therefore with a great deal of interest that we will receive this morning's testimony.

Mr. Chairman, it has been no surprise to the members of the committee that the safety and environmental issues of the nuclear weapons complex are viewed by some as an opportunity to place unilateral constraints on our nuclear capabilities. One way of doing this, of course, is to set up a funding constrained choice between cleanup on the one hand, and production and modernization on the other.

Mr. Chairman, guided by the facts as they emerge and the opinion of experts, I hope that we can fashion a plan that will safely provide for the national security while preserving and restoring the environment. I know that Secretary of Energy Watkins is committed to doing this, and I have great confidence in his ability and in his dedication.

Mr. Chairman, I will have questions for our panels at the appropriate time. Thank you, Mr. Chairman, and thank you for your leadership on these most important issues.

Senator EXON. We welcome our witnesses this morning. We are going to start out with Mr. Keith Fultz from the General Accounting Office, and then the second panel will be headed by Dr. Dan Reicher and Mr. James Werner of the National Resources Defense Council.

I will ask you to begin now, and I think we will just throw it open to your statements. First let me say that we will accept your full statement as prepared for the record without objection, and I would like to ask that you summarize at this time.

So please proceed, Mr. Fultz.

STATEMENT OF KEITH FULTZ, DIRECTOR, ENERGY ISSUES, RESOURCES, COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION, GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY WILLIAM F. FENZEL AND GARY JONES, EVALUATORS-IN-CHARGE, RESOURCES, COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION

Mr. FULTZ. Thank you very much, sir.

With me this morning are two of my colleagues who have been responsible for many of the 50 reports and testimony on this subject GAO has issued since 1981. On my left is Gary Jones, and on my right is Mr. William Fenzel.

We are pleased to provide our views on the environmental problems facing the DOE weapons complex. The complex does have serious problem areas, as you mentioned, including aging facilities, environmental contamination and safety concerns which have shut down many operations.

The estimated cost to address these problems is staggering, ranging up to as high as $155 billion. The environmental area may be the most costly and in many ways the most difficult to resolve. We estimate it will cost between $35 and $65 billion to clean up the contamination. In some instances, new technologies will have to be developed, and some areas may be irreversibly contaminated and will require institutional control.

Finally, I think it is important to note that DOE is still characterizing and analyzing contamination; thus, additional cleanup issues may surface as the years progress.

In September 1986, GAO recommended that DOE develop an environmental strategy which would provide Congress with a comprehensive report on DOE's plans to clean up existing contamination as well as to bring the facilities into compliance with environmental laws.

Recent plans and reports have shed considerable light on the problems that DOE faces; however, none of these, either taken individually or collectively, provide an overall comprehensive environmental strategy that you referred to in your opening remarks.

In order to put some of these environmental concerns in perspective, I would like to highlight some of the problems our work has identified over the past several years. Specifically, we have reported on the following types of problems: leaks from high level radioactive waste tanks; groundwater contamination at numerous sites throughout the complex; soil contamination at many facilities; identification of over 3,000 inactive waste sites nationwide; and finally, noncompliance with various air, water and solid waste legislation.

As I said earlier, we know considerably more about the environmental problems than we did a few years ago; however, the specifics are still evolving regarding how funds will be spent, what technologies will be used on the individual sites, and to what level the sites will be cleaned up.

Although DOE has issued several plans and reports that discuss contamination in the complex, specific long-range plans are needed so that Congress can judge the pace, direction and priorities of the cleanup program. Such plans should highlight not only the cost but also what cleanup projects will be undertaken and when.

Finally, the plan should also address the adequacy of DOE's overall structure, including technical expertise and financial controls for managing this massive cleanup that is going to be required, which together with the modernization effort, we have called probably the largest rehabilitation program ever undertaken.

Next I would like to comment on DOE's 1990 budget request. Because DOE is still characterizing the nature of their environmental problems, we would not recommend large increases above the $410 million requested for cleanup. Clearly, expenditures will increase dramatically in the next few years to fund large-scale cleanup projects; however, DOE will be in a better position to effectively and efficiently spend large amounts of money once the problems are better defined.

In summary, the environmental situation at the complex has important ramifications for the Nation. From a budgetary perspective, estimates to clean up the complex range from $35 to $65 billion, as I stated, with another $3 to $9 billion needed to bring the operations into compliance with environmental laws.

The Secretary recently testified that these estimates were speculative and indicated the actual cost may be lower. We recognize that these estimates are not budget quality, and thus they are not precise; however, we have not seen any information that shows the cost will be substantially lower than the estimates already made public by the Department of Energy. Now, as we have previously testified, there are indications that the eventual cost could even be higher.

From an environmental perspective, widespread contamination exists in the groundwater and soil at most of the facilities. It has actually spread offsite at some facilities where it could potentially affect the public. Moreover, some sites may be irreversibly contaminated. Indeed, we may have to place them in long-term institutional care.

We do have a better understanding of the environmental problems facing the complex today; however, as I stated, DOE is still in what we would call the study phase. It is continuing to develop information on the extent of the problems and the possible solutions.

As you referred to, Mr. Chairman, the Secretary has recently announced that the Department is developing a 5-year environmental plan. If this plan includes sufficient details on the cleanup procedures, milestones and costs, it could evolve into the comprehensive strategy that we called for in 1986. We hope it will provide Congress with the information needed to make important programmatic and budget decisions for the complex.

That concludes the summary of my statement, and we would be pleased to respond to any questions that you or other members may have.

[The prepared statement of Mr. Fultz follows:]

Statement of Keith O. Fultz
Director, Energy Issues
Resources, Community, and
Economic Development Division

Mr. Chairman and Members of the Subcommittee:

We are pleased to provide our views on the environmental problems facing the Department of Energy. My testimony is based on a large body of work, over 50 reports and testimonies since 1981, on environmental, safety, and health aspects of DOE's nuclear weapons complex. This work has shown that the complex faces a wide variety of serious problem areas including aging facilities, safety concerns which have shut down DOE's production reactors, and environmental cleanup. The estimated cost to address these problems is staggering--ranging up to $155 billion.

Of all the problems facing DOE's complex, the environmental problems may be the most costly and, in many ways, the most difficult to resolve. DOE faces two overall systemic environmental problems: cleaning up existing environmental contamination in groundwater and soil, and bringing its facility operations into full compliance with environmental laws. Both problems are formidable. Our estimates indicate it will cost $35 billion to $65 billion to clean up existing environmental contamination at the DOE nuclear weapons complex. Getting the necessary funds in a deficit era will be difficult. Further, in some instances new technologies for cleaning up the waste will have to be developed and, at some locations, specialized equipment and techniques will be needed to protect the workers involved in the cleanup. In the final analysis, some areas within the complex may be irreversibly contaminated and thus require long-term institutional control. Bringing DOE facilities into full compliance with environmental laws will cost another $3 billion to $9 billion. These funds are needed to correct current waste management problems and build additional treatment and storage facilities. Finally, DOE is still in the process of characterizing and analyzing its environmental problems. Thus, additional problems may surface.

Because of the huge backlog of environmental problems facing DOE, we recommended, in September 1986, that DOE develop an environmental strategy which, among other things, would provide the Congress a comprehensive report on DOE plans to clean up existing contamination and bring its facilities into full compliance with environmental laws. In March 1987, we recognized a broader need and recommended an overall strategy for the weapons complex which, in addition to providing details for addressing the environmental problems, would also address modernization of the complex and safety problems. Recent DOE plans and reports have shed considerable light on the problems DOE faces; however, none of them taken individually or collectively provide an overall comprehensive environmental strategy.

The remainder of my testimony provides a perspective on (1) the environmental problems DOE faces, (2) DOE efforts to develop an overall environmental strategy, and (3) our views on DOE's fiscal year 1990 budget.

DOE'S ENVIRONMENTAL PROBLEMS

In making nuclear weapons, enormous amounts of hazardous and radioactive wastes are generated. Historically, this waste was disposed of by methods that allowed the waste to enter the environment. Some general examples of the waste disposal practices used throughout the complex included shallow land burial for solid wastes, and direct discharge of liquid wastes into surface impoundments, trenches, and seepage basins. Compounding DOE's environmental problems were storage tanks that leaked and accidental spills from normal operations.

Our work over the past several years has described a variety of serious unresolved environmental problems. Specifically, we have called attention to:

- -- Leakage from high-level radioactive waste tanks. Over 50 of the 149 single-shell tanks at Hanford, Washington, have leaked or are suspected of leaking high-level radioactive waste into the environment. Some of these leaks were detected more than 20 years ago.

- -- Shallow burial of transuranic wastes.[1] DOE has a multi-billion dollar effort to put transuranic wastes in a geological repository in New Mexico. However, DOE's plans only call for sending about 20 percent of its transuranic wastes to the repository. DOE has made no commitment regarding the permanent disposal of the remaining 80 percent, most of which is in shallow burial grounds at various DOE facilities around the country.

- -- Groundwater contamination at numerous facilities throughout the complex. As a result of past disposal practices, the groundwater at many DOE facilities has become contaminated with hazardous and/or radioactive material, some at levels hundreds to thousands of times above the drinking water standards. Some contaminated groundwater has migrated off-site.

- -- Soil contamination at facilities throughout the complex. As a result of past practices, soil has become contaminated with radioactive and/or hazardous material. At some locations, the radioactive and/or hazardous material has migrated off-site.

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[1] Transuranic wastes are man-made radioactive materials that include plutonium and are generally long-lived and toxic.

-- Inactive waste sites. DOE has identified over 3,000 inactive waste sites throughout the complex. Many of these sites contain a variety of toxic, hazardous, and/or radioactive material.

-- Noncompliance with environmental laws. DOE has had difficulty in maintaining compliance with various environmental laws. Most of the sites in the weapons complex need corrective actions under various air, water, or solid-waste statutory requirements.

Several DOE documents have been furnished to the Congress in the last 6 months which recognize the severity of the environmental problems within the complex. In September 1988, DOE issued a preliminary environmental summary report which ranked major environmental problems in the complex.[2] In December 1988, DOE issued a report detailing environmental, health, and safety needs of all its facilities, including those of the complex.[3] And finally, in January 1988, DOE issued a modernization plan,[4] mandated by the Congress.[5] Among other things this plan was to include the actions necessary to ensure the complex operates in an environmentally acceptable manner.

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[2] Environmental Survey Preliminary Summary Report of the Defense Production Facilities (Sept. 1988).

[3] Environment, Safety, and Health Needs of the U.S. Department of Energy (Dec. 1988).

[4] United States Department of Energy Nuclear Weapons Complex Modernization Report (Report to the Congress by the President, Dec. 1988).

[5] National Defense Authorization Act for Fiscal Year 1988/1989 (P.L. 100-180, Dec. 4, 1987).

The plan and reports, in our view, reflect the study phase that DOE is currently in. DOE, to a large degree, is studying the extent and severity of the contamination to better characterize the nature of its environmental problems. DOE has not developed a detailed plan for resolving the environmental problems of the complex.

DOE'S ENVIRONMENTAL PLAN STILL EVOLVING

As a result of the recently issued modernization plan and other DOE reports, we know considerably more about the environmental problems facing DOE now than we did a year ago. We have cost estimates to approximate the formidable size of the challenge ahead. About $35 billion to $65 billion is going to be needed to clean up environmental contamination, and another $3 billion to $9 billion is needed to bring DOE's operations into compliance with environmental laws. The specifics are still evolving, however, regarding how these funds will be spent, what technologies will be needed to clean up individual sites, and to what levels DOE sites will be cleaned up.

DOE's preliminary summary report contains the preliminary results of DOE's environmental surveys. These surveys were initiated in late 1985 to identify environmental problems within the complex. The report presents information on environmental problems at all DOE defense sites and ranks 155 environmental problems. This report, however, does not lay out plans for resolving these problems.

DOE's environmental, safety, and health needs report provides more detailed information on the cost to clean up DOE facilities and bring them into compliance with environmental laws. The report, for each site in the complex, provides a listing of current or proposed cleanup and compliance projects as well as cost estimates for each project. However, a large percentage of the total estimated cost cited as needed in the report is not tied to specific long-term cleanup projects. Further, the report does not lay out year-by-year milestones and schedules so that progress can be measured.

The modernization report lays out DOE's view of what facilities will be needed in the year 2010 to meet production needs. Accordingly, the plan called for new facilities as well as upgrades to existing facilities. Some DOE facilities will be phased out or relocated by 2010. The plan does not clearly define what environmental problems will be resolved during the same time frame. The plan does not show key decisions on the extent of environmental cleanup or which sites get cleaned up first.

DOE's modernization plan and the two aforementioned reports neither individually nor collectively represent detailed plans for resolving the environmental problems of the complex. Specific long-range plans are needed so that the Congress can judge the pace, direction, and priorities of DOE's cleanup program. Such plans should highlight not only the cost, but also what cleanup projects will be undertaken and when. Well-conceived plans are also needed to avoid or minimize problems that have occurred in the Superfund program administered by the Environmental Protection Agency (EPA). The problems include cost increases when the cleanup actually begins, inadequate contractor performance, and the lengthy process for evaluating cleanup alternatives. Finally, such plans should address the adequacy of DOE's overall structure, including technical expertise and financial controls, for managing this massive cleanup effort.

DOE'S FISCAL YEAR 1990 BUDGET FOR ENVIRONMENTAL ACTIVITIES

Next, I would like to briefly discuss DOE's fiscal year 1990 budget request, as amended by the new administration. Of the $9.4 billion now requested for the complex, approximately $1.1 billion is earmarked for correcting environmental problems. According to DOE, this level of support represents their commitment toward cleaning up the complex and bringing it into compliance with environmental laws.

The $1.1 billion for addressing environmental problems within the complex represents a $408 million, or 57 percent, increase in funding over fiscal year 1989 levels. More specifically, funding for activities to ensure that DOE operations comply with environmental laws has been increased by $166 million to $725 million. Funding for environmental cleanup of existing contamination has been increased by $242 million to $401 million.[6] These funding levels include the additional funds recently proposed by the new administration. DOE's request does represent increased funding for correcting environmental problems; however, given the magnitude of the environmental problems and the enormity of the cost to correct them, the fiscal year 1990 funds are only a small down payment on resolving them. This is particularly true in the environmental cleanup area, where DOE plans to spend $401 million in fiscal year 1990 on a problem that may cost over $60 billion.

It is important to note that the level of funding requested for fiscal year 1990 reflects the fact that DOE is still in the process of determining the extent of the environmental contamination. According to DOE budget information, about 60 percent of the funds requested for environmental cleanup are for studies to assess and characterize the environmental problems at DOE's sites. According to DOE officials, these studies are a prerequisite to developing long-range cleanup plans with state governments and EPA.

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[6] About $24 million of these funds will be used for decontamination activities at DOE facilities.

Key decisions, made by DOE together with state governments and EPA, on the level of cleanup at many of these facilities may be years away. According to DOE officials, establishing cleanup standards pursuant to environmental laws for many facilities may take as long as 5 to 7 years. In addition, in some cases, new techniques and technologies will have to be developed and implemented to address unique cleanup situations existing at many of the sites. Some cleanup is being accomplished today, but the bulk of the cleanup effort is still years away.

For these reasons, we would not recommend large increases over and above the DOE request for fiscal year 1990. Clearly, expenditures will likely increase dramatically in the next few years to fund large-scale cleanup projects. But for now, DOE is still characterizing the nature of their environmental problems. Once these characterizations are more complete DOE would be in a better position to effectively spend the large amounts of money needed to clean up its facilities.

SUMMARY

In summary, the environmental situation at the DOE complex has important ramifications for the nation.

-- From a budgetary perspective, estimates to clean up the complex range from $35 billion to $65 billion, with another $3 billion to $9 billion needed to bring DOE facility operations into full compliance with environmental laws. Recently, the Secretary of Energy testified that these estimates were speculative and indicated the actual cost may be lower to address some of the problem areas of the complex. We recognize that these estimates are not budget quality and thus somewhat speculative. However, we have not seen any information that shows the cost will be substantially lower than the estimates already made public by DOE. As we have previously testified, there are indications that the eventual cost could be higher.

-- From an environmental perspective, widespread contamination exists in the groundwater and soil at most DOE sites. More ominously, the environmental contamination has spread off-site at some facilities where it could potentially affect the public in surrounding communities. Moreover, some sites may be irreversibly contaminated, and DOE may have to place them in long-term institutional care.

Today, we have a better understanding of the environmental problems facing the complex. However, DOE is still, to a large degree, in the study phase and is continuing to develop information on the extent of the problems and possible solutions. DOE is also developing environmental plans. According to the Secretary of Energy, the Department is developing a 5-year environmental cleanup and waste management plan which should be available in August 1989. This plan, if it includes sufficient details on cleanup procedures, milestones, and costs, could evolve into the comprehensive strategy we originally called for in 1986. We hope this plan will provide the Congress with the necessary information to make important programmatic and budget decisions necessary to cleanup and modernize the complex.

Thank you, that concludes my testimony. We will be happy to answer any questions.

Senator EXON. Thank you very much, and we appreciate your coming over to give us your thoughts today.

Mr. Fultz, you have stated that GAO does not recommend large increases over and above the DOE cleanup request for fiscal year 1990. Can you explain the basis for that view? Can you identify any specific unfunded project that your research and analysis leads you to conclude are worth funding?

Mr. FULTZ. Yes.

Senator EXON. Or should we give Admiral Watkins a lot of leeway?

He has promised, as you know, to come forth with what he thinks should be done, and I am convinced that he is going to ask us for what he thinks can really be done from a positive standpoint rather than just order a lot of reports. Some reports or studies obviously have to be made.

I guess what I am pressing you for, do you see any project that if we had some additional funds you would recommend that they be so employed?

Mr. FULTZ. Yes. I would like to respond to that question.

First of all, I would like to make it very clear that we recognize in the out years, 2 or 3 years, we are going to need to be spending a substantial amount of money in the complex for environmental cleanup. You are looking at in the magnitude of perhaps a couple billion dollars per year to get this situation back where it needs to be.

At this time we do not believe that the Department of Energy has the proper structure or the right amount of technical expertise. In fact, both former Secretary Herrington and Secretary Watkins have told me in the meetings I have had with them that they are concerned about the technical expertise that exists within the Department, and until they get the proper structure and understanding of the extent and characterization of the problem, we would suggest that DOE proceed slowly and cautiously.

There are areas, however, where we think funds could be prudently spent. This would include areas such as additional monitoring at the facilities. Some facilities are woefuly inadequate in the extent and quality of monitoring that presently exists. We would suggest in the magnitude of perhaps $50 to $100 million could be added to this activity.

Also, much of the information and knowledge with which we will eventually clean up these facilities at this point is unkown. Therefore, we would suggest that areas such as research and development, perhaps by the weapons laboratories, to develop techniques, procedures, and perhaps breakthrough technologies that would enable us to clean up the facilities in a much more efficient and effective manner could use additional funds.

Those would be the two areas that at this point we would feel quite comfortable in suggesting additional funds.

Senator EXON. Mr. Fultz, Admiral Watkins has stated that he believes that estimates of $65 billion for the environmental cleanup are too high and that current estimates have a lot of what he referred to as gold watches in them.

He has indicated his determination to bring these costs down in part by developing some new technologies, I assume some of the ones you just referred to in your answer to my previous question.

What is GAO's view of this approach? Do you tend to agree or disagree with the assessment given thus far by the new Secretary?

Mr. FULTZ. At this point I would tend to disagree. I hope he is right, quite frankly. The order of magnitude of $35 to $65 billion in the budget deficit era that we find ourselves in is going to be very difficult to fund. Based upon the information that we have seen, which incidentally has been provided for the most part by the Department of Energy and outside study groups that have reviewed the Department of Energy complex, I at this point have not seen any basis or justification that would support figures much lower than the ones we have suggested and, as I said, that have been publicly stated by previous Department of Energy officials.

Again, I hope it is not that expensive, but at this point I would be very conservative in saying that we will not need to spend that type of money.

Senator EXON. In your view, if the Department of Energy needs outside assistance in developing a comprehensive approach to the obviously serious problem that we have, would this assistance be provided by an independent group of wise men or wise women such as in the Packard Commission; or in your view would it be best to bring together all the political stakeholders in the cleanup process and make them the wise men and wise women?

Mr. FULTZ. I think, as you said earlier, we need to give the Secretary some time. He has announced the idea of establishing an environmental cleanup and waste management plan which we had called for about 3 years ago; but frankly, we are somewhat frustrated that the Department is still in what we call the study phase.

I hope this time we do get the right plan under way and we can begin to take on this massive cleanup effort.

There have been some other ideas suggested. Chairman Dingell has suggested the establishment of a commission which I would assume would include some of those wise men and women that you mentioned earlier. That idea has merit.

I think the significance and the seriousness of the problem would indicate that we do need some help. We have, however, met with Secretary Watkins on two different occasions. We are very encouraged by his commitment. We are very encouraged by his knowledge of the problems within the complex. I think it would be prudent for us to give him some time to study and to get a handle on the problems. We do not have much time. We need action, and we need action rather quickly.

Senator EXON. Thank you. My time is up on the first round.

I am pleased to recognize Senator Glenn.

Senator GLENN. Go ahead and finish up if you want to.

Senator EXON. All right.

Mr. Fultz, GAO has supported strengthening the oversight of the DOE of defense facilities, as you know, such as that provided by the Defense Facilities Nuclear Safety Board that was established by Congress last year.

Admiral Watkins and the other DOE officials have recently spoken of the additional need to strengthen DOE's line management and their operating structure which is responsible for ensuring that the facility is operated safely and that cleanup activities are carried out.

Does GAO also support an effort to strengthen the quality and management of DOE's programs and line management; if so, what priority or importance would you associate with it?

Mr. FULTZ. We would absolutely support that concept. We share the concerns of the former Secretary and the current Secretary that the Department does not have adequate resources in the areas of technical expertise and perhaps even the right type of expertise, and we certainly would support that.

One area that I think we would really need to be strengthening is in the area of cleanup, and decontamination and decommissioning of the facilities. This is a relatively new science, and even in the commercial world we have not had much experience. The TMI example I think is very evident. We were thinking we could clean up TMI for a couple hundred million dollars in not too many years. To date, it has been over 10 years and the country has spent over $1 billion to clean up the waste from just that one facility. I think those are two areas we would have to be very, very careful about getting the proper structure to manage the programs within the Department.

We do have concerns about the structure of the operations office concept within the Department. For example, the incidents at Savannah River going unreported and not brought to the surface at headquarters would indicate that the proper management systems are not there to raise important and critical information to the decisionmakers. That has to be worked on.

As I said earlier, I am encouraged that the Secretary has a good grasp of these problems and will begin to address the types of situations that have previously occurred.

Senator EXON. Thank you, Mr. Fultz.

Senator Glenn.

Senator GLENN. Thank you, Mr. Chairman. I would ask that my opening statement be included in the record in its entirety, and I will extract some ideas from that if that is all right with the Chair.

Is it all right to enter the statement in the record?

Senator EXON. Without objection, that is so ordered.

[The prepared statement of Senator Glenn follows:]

PREPARED STATEMENT OF SENATOR JOHN GLENN

As the United States approaches the end of this century, among the most serious and challenging problems our nation confronts is the enormous radioactive and toxic legacy of nuclear weapons production. The discovery of the true scope of the environmental contamination at the U.S. Department of Energy's (DOE) nuclear weapons complex has taken years and is likely to continue. Unfortunately, we don't have the luxury to find out the full extent of this problem before we take decisive action. While the costs of cleaning up DOE sites are great, the costs of delay are far greater.

Yesterday, I understand that the Department of Energy and the Environmental Protection Agency indicated to this subcommittee that the current fiscal year 1990 budget for DOE clean up activities is sufficient. However, according to the EPA's evaluation of DOE's fiscal year 1990 pollution abatement spending, a different picture emerges. This EPA report, prepared for the Office of Management and Budget in December of last year, shows that there are over 40 DOE environmental projects that are in violation of environmental standards for which no funds have been requested by DOE in fiscal year 1990. I am requesting clarification from EPA on this matter.

In this regard, I plan to seek additional funding in the DOE's fiscal year 1990 Budget Authorization for environmental, safety and health improvements. Like the General Accounting Office, I am skeptical that the DOE can gear up to accommodate the levels of E,S,& H spending which GAO suggests are on order of an average of $4 to $6 billion per year. There is little doubt that DOE has to make some major changes in its management practices before such large sums can be wisely spent.

Nonetheless, there are some specific areas where increased spending will help speed up the process. First, we need to start to invest in a meaningful environmental, safety and health research and development program. Such a program needs to be centralized, with a coherent mission. Currently, DOE's ESH R&D efforts are fragmented and scattered throughout the agency. The national laboratories, while having done excellent work in nuclear energy R&D, suffer from the same problems of isolation and are not part of a DOE-wide program to tackle the enormous cleanup task ahead.

Any increases in spending must also be geared towards achieving compliance with federal and state environmental laws. A major reason why the costs of DOE site clean up are so large is because of the failure of the Federal government to assure that its agencies comply with environmental laws on a timely basis. Instead, the DOE has been operating under a system where federal nuclear facilities are built and operated before the basic environmental standards are developed. The ongoing failure of DOE facilities to achieve compliance will continue to translate into ballooning costs.

If we are going to avoid the costly mistakes of the past, the cleanup of DOE sites must be driven by responsible standards and guidelines developed by the U.S. Environmental Protection Agency. This means the EPA will have to make federal facility compliance a higher priority.

Finally, funds must be made available to begin the process of retraining existing contract workers at DOE facilities to clean up DOE sites. The skills and dedication of these people are too valuable to lose.

The task ahead of us is difficult, expensive and complicated. In carrying out this task we must be guided by the basic principal that the federal government should become the model and not the exception for environmental, safety and health protection. Otherwise, we face the likely prospect of repeating the same mistakes that now threaten not only our important nuclear deterrent but also the health and environment of our citizens.

Senator EXON. You go right ahead.

Senator GLENN. Thank you.

I have a couple of questions on some of the funding that I will extract from my opening statement and follow up on.

EPA did an evaluation of DOE's fiscal year 1990 pollution abatement spending, and instead of indicating that no additional money was required, the EPA report, which was prepared for OMB in December of last year, shows there are over 40 DOE environmental projects that are in violation of environmental standards for which no funds have been requested in 1990.

We are requesting clarification from EPA, but what are your thoughts on that? Have you looked into that? Do we not need additional money in those areas? Those projects are sitting there, just waiting to have action taken on them right now. The only thing lacking, as I see it, is the money. Is that correct?

Mr. FULTZ. I am not aware, Senator, of the 40 examples that you gave there. We have not done a detailed analysis of specific sites and what funding is needed for those specific sites at this point. That is hopefully going to be part of the environmental plan in the waste program that the Secretary has announced, and we would certainly review that plan very carefully when it is issued sometime this summer, and we would like to get back with you on that.

Senator GLENN. I would appreciate that very much because it appeared to me and to the people who have looked into it that, Mr.

Chairman, those are areas where we do not need research. We have over 40 different projects that they have outlined that need cleaning up right now to be safe, just to come into minimal compliance. Those areas need nothing but the money, the congressional support and the go.

So I would appreciate any comments you could give us on that and ask that you look into this problem.

I plan to seek some additional funding in DOE's fiscal year 1990 budget authorization for ES&H. But, I think we have to be careful sometimes in talking about these matters to separate out some of the ES&H spending from the cleanup spending. ES&H is much more of an ongoing problem of a current danger to people right there in the communities and the people working at these facilities. Of course, the longer term cleanup involves a much broader scope.

I have felt that the funding DOE requested for ES&H was low and that funding for cleanup also was low. Some of these areas we are able right now to clean up, and I do not think we are doing that.

So I would like to seek additional funding for ES&H areas in particular, as well as for cleanup. Like GAO in its testimony, I am a little skeptical that DOE can gear up to accommodate the levels which GAO suggests are in order. As I understood it, GAO suggests those levels could be as high as $4 to $6 billion a year.

Now your $2 billion figure, that was just cleanup? That is not ES&H?

Mr. FULTZ. Right. I think in the out years it is going to be in that order of magnitude.

Senator GLENN. Now if your $2 billion was cleanup, that did not include all the ES&H?

Mr. FULTZ. That is correct.

Senator GLENN. So that is going to be $4 to $6 billion a year. You had another couple billion for cleanup, and we are coming up to the $8 or $10 billion mark for what is going to be necessary on a sustained basis over perhaps two decades to really get a handle on this whole problem.

There are some specific areas where increased spending will help speed up the process. I think you mentioned research into ES&H. What was your comment on that? Do you feel we have enough going into that now?

Mr. FULTZ. Into the research area?

Senator GLENN. Into the research area. You said not enough?

Mr. FULTZ. Not enough.

Senator GLENN. Do you have an estimate of how much additionally is required in that area?

Mr. FULTZ. At this point I could not give an exact figure, no.

Senator GLENN. We also have spending that must be geared toward achieving compliance with Federal and State environmental laws. One major reason why the costs of DOE site cleanup are so large is because of the failure of the Federal Government to assure that its agencies just comply with existing laws on the books on a timely basis.

Mr. FULTZ. At this point according to DOE estimates, the figures to bring the facilities into compliance would be between $3 and $9 billion. So I would certainly agree that the cost would be substantial.

Senator GLENN. Now is that total?

Mr. FULTZ. That is correct.

Senator GLENN. That is not per year; that is a total?

Mr. FULTZ. That is a total; just to bring existing facilities into compliance with existing environmental legislation.

Senator GLENN. Now that money has not been requested, is that right?

Mr. FULTZ. Not all of it, no.

Senator GLENN. How many years would it take to do that? Do you have any estimate on that?

Mr. FENZEL. To the best of my understanding, Senator, it is in about 10 years DOE should spend the $3 to $9 billion to bring them into compliance.

Senator GLENN. That is just to come up to compliance with current law.

How about EPA? Do you feel it is giving this problem enough attention? I have felt that EPA is going to have to make Federal facility compliance a higher priority than it has up to now.

Mr. FULTZ. I believe that is correct, and with the increases in funding for the DOE program I think you are going to be needing some commensurate increases in the oversight and the funds for the EPA also.

Senator GLENN. We are going to have to have funds available to begin the process of retraining existing contract workers at DOE facilities to clean up these sites. Do you have any comments on that or estimates of what is going to be required, the money required to do retraining?

Mr. FULTZ. I think that there is need for retraining in the environmental area as well as in the safety area. I think that it is recognized in the Department currently that the safety culture in the Department of Energy and in the various operational offices is just not what it needs to be. We need a very strong safety policy. We need to implement that policy. This is an area that, frankly, concerns us.

It is going to take time. The incidents that have occurred at Savannah River in the last 6 months and in fact most recently within the last month or 6 weeks would indicate that we still have very serious problems in getting the safety culture engrained in the workers, in the operators of these facilities.

Senator GLENN. Just as a comment, it is quite one thing to have a new boss at DOE. I do not question at all the dedication of Secretary Watkins and Troy Wade and Mr. Starosteki and some of the other people there. However, it is quite a different thing to change the mindset of the whole outfit underneath him.

Similarly, it is one thing to have the right words coming out of the captain's cabin, but it means nothing unless the direction of the whole ship changes. We must change the mindset that has existed in DOE all these years, a mindset that got us into this mess in the first place. That is a big juggernaut whose direction is going to require some effort to change. So I, too, as with the chairman, have a lot of faith in Mr. Watkins. But he is going to need a great deal of support to change the direction of things. For all these years, the right words have been coming out of headquarters. To some extent, the right standards have been set from headquarters, but those standards just have not been carried out at the GOCO (government-owned, contractor-operated) plants, and that is going to be a difficult task indeed.

Mr. Fultz, what facilities should receive the $50–$100 million additional funding for monitoring that you suggest could be wisely spent?

Mr. FULTZ. The facilities for increased monitoring?

Senator GLENN. Yes. Is that a general figure, or do you have specific facilities in mind that should receive that additional funding?

Mr. FULTZ. I would say generally the entire complex needs to be examined to determine the extent of monitoring and what improvements in monitoring, and quality assurance of the monitoring data could be made. A facility that comes to mind specifically would be Rocky Flats. In fact, I believe that there are plans presently to place an additional 275 monitors at the Rocky Flats facility. I think Fernald and Savannah River may need some more monitors.

Frankly, that is one of the disturbing things that we found in reading the environmental surveys conducted by the Department of Energy within the last 2 or 3 years, that virtually every one identified significant monitoring, quality assurance, and operator training problems. Again, Senator, that is why we think that the monitoring area needs to be bolstered substantially.

Again, until we have good monitors we are not going to know the true extent of contamination, and we are not going to be able to properly characterize the contamination.

Senator GLENN. Secretary Watkins has been quoted as saying that the outside independent oversight structures put into place or presently being contemplated by Congress may interfere in some way with his efforts at internal reform within DOE.

Do you see any real danger of that happening? Should we pull back in any way on the principal of strong, outside independent oversight of DOE?

Mr. FULTZ. At this point I think we do need strong independent oversight at the Department of Energy. I think why we are where we are today was the lack of oversight internally within the Department. Until we can assure ourselves for the DOE complex that proper attitude, safety culture, concern about environment and safety as well as production exists, I think we need a very strong independent oversight.

In this case it might be a little bit duplicative, but given the seriousness and extent of the problems, I think that we could err on the side of too much in this case rather than not enough.

Senator GLENN. My time has expired. I have a couple more questions, Mr. Chairman.

Senator EXON. I have just one more question, and then I will yield back to you, Senator Glenn.

In this whole cleanup matter, Mr. Fultz, do we have anything that we can learn from our European friends and allies? Some of those people have been very much involved in both civilian and military application of nuclear weapons and nuclear production for a long, long time.

Do they have a cleanup problem today? Have they ignored it, or have they kept up with it? What can we learn from the French, for example, who have done a lot in this area? Where are they on cleaning up their nuclear waste? Can we learn something free of charge over there?

Mr. FULTZ. I think there are experiences that we can draw from. France does have a little bit different system, in that they do reprocessing, which we as a policy have not done.

They have made, I think, more attempts to close the waste cycle. They are currently working on some various techniques, basically vitrification of the waste, which in essence solidifies the waste. I think there are lessons that we can learn.

As a nation we have not closed that end of the loop in the waste area, and that also is going to have perhaps significant impacts on the commercial nuclear industry in this country. It is going to be at least the year 2003 before we have a repository for our commercial and high level defense waste. That is an area that I believe I would call a potential Achilles heel in the whole process.

So I think there are certain things that we can draw upon. In fact, I believe the Secretary has recently stated that he is going to send a team of experts over to France to study what they have been doing. I think that would be very useful.

Senator EXON. Thank you. There may be questions submitted to you for the record and I ask that you answer those as promptly as you can.

I yield back to Senator Glenn at this time.

Senator Glenn.

Senator GLENN. A couple more questions. Would the GAO support transferring the authority of the DOE to conduct radiation health studies, to do the research in that area, to a public health agency?

Mr. FULTZ. We did not study that in detail, but given the other areas with similar circumstances like safety where we have supported independent oversight, I could see some reason or rationale for providing that independent review of what is happening within the Department.

Senator GLENN. We grant that the DOE has the biggest radiation problem, but there are other radiation problems in our society, too, and it seems as though a public health approach to that would be the best one to follow.

Secretary Watkins has stated that cleanup costs will probably be lower, and you have made some comment on that. There are no alternative cost estimates available from DOE that show they will be lower, but he has also stated that, as I understand it and correct me if I am wrong, that occurs with the advent of new technologies.

Mr. FULTZ. That is correct. I would consider it a very large assumption that the technologies will be there. The problem is, given the extent of the problems that we find today, we do not have a lot of time to wait for the new development of technologies. We need to begin to clean up some of these facilities almost immediately.

Senator GLENN. Absolutely. That was going to be my followup question. Can we just sit round and wait until we develop some new technologies? It may be 15 years before we have them. I hope it is not.

Mr. **Fultz**. If the experience of the Superfund is applicable here, and I believe that it is very much so, the longer you wait, the worse the situation gets, and obviously then the more costs, the more money eventually that will be needed.

This is a situation where you really cannot delay, and that is why we say we need to begin the cleanup, but we do agree with supporting additional research in the cleanup technology area.

Senator **Glenn**. Additional resources beyond what has been asked for in this budget?

Mr. **Fultz**. Yes.

Senator **Glenn**. By how much do you think we should increase that amount?

Mr. **Fultz**. We have not given an absolute figure on that. Certainly given the importance of relying on advanced technologies or new technologies, anything that we could do to expedite that would be very, very useful.

Senator **Glenn**. You mentioned Superfund. Would you comment on EPA's record with regard to Superfund management?

Mr. **Fultz**. Well, GAO has reviewed the Superfund program for a period of years, and regretfully the program has not been very successful.

Again, this is why we are somewhat skeptical of the cost estimates here. Those estimates were very low. In fact, within the last 5 years the estimates for a Superfund site have actually doubled as to what it was thought to cost to clean up the average site. We have spent a lot of money, on the order of about $4 billion in Superfund already, and when you compare that to the percentage of the issues that we have cleaned up and that further needs to be done, it is not a very good ratio.

Senator **Glenn**. Is EPA going to need a lot more resources than they have right now to do this, to help on the cleanup at DOE nuclear facilities?

Mr. **Fultz**. Given that the Superfund program is basically a $10 billion program, and we are talking here on the order of magnitude of $35 to $65 billion in cleanup, I would certainly agree that there is going to need to be additional resources and budget at EPA.

Senator **Glenn**. The DOE 2010 plan, you have looked at that and reviewed that, and we have talked to you about that before. In general terms with regard to 2010, what are GAO's views on the balance between modernization versus cleanup activities?

I wanted to preface my question by saying that production at the expense of cleanup is how we got into this mess. Everything had to be "produce," "produce," "produce," "put the wastes out behind the plant, we will clean it up later."

Are we moving away from that notion now, and what do you see in the 2010 study as the balance between modernization and cleanup? Is it better, worse?

Mr. **Fultz**. Clearly, modernization is on a faster track than the environmental restoration. According to the plan, by the year 2010 we would have a virtually revitalized weapons complex system, and it is important that we develop the facilities for producing the weapons material that is needed.

We do, however, question whether or not they place proper emphasis on the environmental area. In fact, as you look at that plan, much of the cleanup will be done in the out years.

In fact, of the $81 billion incremental cost that the Department has estimated will be needed for modernization and cleanup, $52 billion of that is for modernization and revitalization efforts, and only $29 billion of that is for environmental restoration. Clearly I think the emphasis of the plan is again on production.

Senator GLENN. That is something we have to strike a better balance on obviously than we have done up until now.

I have no further questions, Mr. Chairman. I would just say that I hope that as DOE puts together this 5-year plan that GAO can be in touch with them throughout the process because we are certainly going to ask for your analysis of the plan. If we have not asked already, I can guarantee you we will.

I just hope that with this problem being of the magnitude it is and needing all the expertise it does, that all the work that you people have done at GAO in this area through the years with us will be utilized—I think we are up to 23 or 27 reports now?

Mr. FULTZ. Actually it is closer to 50 in the last 7 or 8 years.

Senator GLENN. The cleanup is going to require the best of all of our thinking, including DOE's. I would hope that you can work closely with them and that they are not just going to wait and spring the 5-year plan on us. I would also hope that they can work closely with you and get your views on it as we go along so that we will not take another 6 months to analyze their report once it is made. Hopefully, we can all come out of this working together, and can get the budget and appropriations we need to really get the cleanup started.

I was much encouraged by Mr. Darman's view on this at OMB. He came before the Governmental Affairs Committee, and we talked to him at great length. We met with him and with Secretary Watkins. The chairman has met with these people as well. We need to work together on this, and that includes GAO and the expertise that you folks have.

Mr. Darman and Secretary Watkins were able to get an extra $361 million in over the Reagan budget to at least get started on cleanup. It does not solve the problem. We need a lot more, as you indicate this morning, for EPA, for DOE, for research, all these different areas.

We are also going to need to carefully analyze the 5-year plan so we can really lay out for Congress a project that is going to have to be done on a year-in, year-out basis. We cannot turn this off and on. It is just going to be throwing money down a rathole if we do that. So we have to lay out a detailed, multi-year program in order to get control of this situation and get the cleanup started.

I just hope you can work with them or monitor what they are doing and hope they are cooperative. Whoever the DOE representatives are in the room here today, please carry that message back. We hope you can be cooperative in letting us know what your proposals are along the way so that we can get and give good advice.

Thank you, Mr. Chairman.

Senator EXON. Thank you, Senator Glenn.

Senator Kennedy.

Senator **Kennedy**. Thank you very much, Mr. Chairman.

I think the comments that Senator Glenn has made certainly speak for my concerns as well. I want to, at the outset, thank you and thank the GAO for the work that you have been doing. I think it has been an enormous public service, and I hope it will have an impact in both policymaking and coming to grips with the challenges.

I think in the previous question we reviewed the issues of modernization as well as cleanup. One of the issues—even in the modernization program—is that we are going to have scarce resources. I think, as all of us know, the battle will be made to try to enhance the cleanup activities.

Within the production areas, I would like to focus your attention on one of the items that has been included—the SIS construction project out in Idaho. I understand that a "priority one, time critical and essential" ranking has been assigned to this project.

Is that correct?

Mr. **Fultz**. It is correct. It has a very high priority in their 2010 study.

Senator **Kennedy**. Did you make any judgments in terms of reviewing those priorities, and did you form any opinion as to the appropriateness of that ranking?

Mr. **Fultz**. We have not taken a position on the need for the SIS at this point. I will say, however, that when I saw the order of priority and the critical nature with which the SIS was purported in the plan, I was somewhat surprised because they do have plans to enhance plutonium recovery in other facilities at Savannah River and Rocky Flats. Also, given the very critical need for our Nation today is tritium, I was surprised by the level of priority which the Department has placed on that new SIS facility.

Senator **Kennedy**. Where were those plants? Were they also priority ones?

Mr. **Fultz**. The plutonium-enhancing abilities at those plants are also in the 2010 study.

Senator **Kennedy**. What is your own assessment of whether we will have greater need for production of tritium rather than the production that comes out of the other facilities?

Mr. **Fultz**. In order to be specific I would have to get into classified information, which we could brief you on if you would like. In general terms, the need for tritium is, I think, very clear and demonstrates that we need to begin production rather quickly. In fact, the Department has publicly stated that by the end of the year we need to have something going from two standpoints: for production and for the credibility of the Department. At this time, the public and, my sense is by the number of reviews and contacts and testimonies that I find myself giving in this area, the Congress are very critical and skeptical about the credibility of the Department.

DOE needs to begin to show that they can run these facilities in a safe, environmentally sound manner and keep production, safety and environment on the same level.

In order to do that, we need for the facilities at Savannah River, the reactors, to operate again.

Senator **Glenn**. Would you yield just for a moment?

On this very subject here, they asked for two reactors. Senator Kennedy asked about the SIS up in Idaho. Have they prioritized yet if we go to one which one they would take, Savannah River or SIS?

Mr. FULTZ. At this point it is my understanding, and my recent information would indicate, that they have both the new reactor at Savannah River and the gas/cooled high temperature reactor at Idaho Falls on the same level of priority.

Senator GLENN. If we go to one reactor, what would be your thoughts? Has DOE expressed what they would do in that case, and what are your thoughts on that?

Senator EXON. They have refused thus far to take any stand. They have been asked that on numerous occasions, and I think it is a good question, Senator Glenn. It is a question that is going to have to be answered sooner or later.

I do not see that we have the money to go full bore on both of these. I think we had better focus on new production facilities for tritium particularly. That should not be in competition with the cleanup efforts. They have to both go forward, and certainly the new production reactors have to have high priority, but I do think that we have to begin to make a decision as to what we are going to do in terms of one or two reactors.

It seems to me that it would be logical because of our critical tritium needs that we would go to the heavy water reactor first at Savannah River because we know that that system does work, and complete it before we begin building a second reactor.

I have not had anybody thus far from the Department of Energy say yes, that is right. Do you know what their feelings are?

Mr. FULTZ. GAO has not taken an official position on this, but I would say, given the fact that the heavy water reactor at Savannah River is estimated to produce 100 percent of goal and the Idaho reactor is estimated to produce 50 percent of goal; the fact that the Savannah River reactor is a proven technology with experience, in fact right on site, and the Idaho reactor is a new technology reactor; if in the budgetmaking mode we have to make a decision, I think the indications would be such that you would favor the heavy water reactor at Savannah River.

We have not taken that position. I think there is need to further study the benefits of both. The reactor at Idaho Falls does pose some interesting concepts for DOE as well as the commercial industry. It is getting closer to what is called the "inherently safe" reactor.

I share your concerns in the budget deficit era that perhaps we need to make some very, very hard decisions based upon priorities and what amount of money we think we can spend.

Senator KENNEDY. I like the first part of your response, and I think what you have said here is very, very helpful.

Let me just move on quickly to where you would put in your list of priorities, assuring current and future capabilities to recycle and recover existing inventories of plutonium. Where do you believe that ought to be in terms of priorities?

Mr. FULTZ. Again, in order to be specific I would have to get into classified, but I think it is fair to state and feel comfortable I am not getting into classified here that the situation with plutonium is not nearly as critical as we find ourselves with tritium. So I would think that if there is an area where we can be a little bit cautious and take our time perhaps a little bit more, it would be in the plutonium area.

We do seem to have a rather large stockpile of plutonium in various forms.

Senator KENNEDY. My time is up, Mr. Chairman.

Senator GLENN. Take time out of mine if you want.

Senator KENNEDY. I do not know if there is anything further, and perhaps you responded earlier to Senator Glenn about the priorities and accelerating the characterization and assessment of the contaminated sites.

Senator EXON. He has gone into that quite thoroughly.

Senator Gorton.

Senator GORTON. Thank you, Mr. Chairman. I am sorry I have come in late after our earlier meeting this morning.

Just one question, Mr. Fultz. The Department of Energy states the proposition that a 30-year cleanup schedule at Hanford is what it characterizes as extremely aggressive. Do you agree or disagree with that characterization?

Mr. FULTZ. It is hard to say that any period such as 30 years would be aggressive. I will say that the contamination at the Hanford reservation is very severe and very extensive. They have over 1,000 inactive waste sites on that facility alone.

Presently, they have approximately 177 tanks which have been storing high level radioactive waste since the early 1950s. In fact, 50 of those tanks have either leaked or been suspected of leaking. It is going to take about a quarter of a century, 24 or 25 years, just to process that waste that currently exists and is sitting in those tanks to put it in a form that will be readily accessible or handleable by the Nation's repository. It is going to take a long period of time to process the waste.

As to cleaning up, I think that is an area that I remarked earlier that the Department of Energy needs to better characterize and determine the extent of contamination. Once they do that and find out perhaps that the contamination has spread farther than what they now believe, maybe getting closer to an aquifer, or the Columbia River, which is a very serious concern out there, they might have to change their time schedule and increase or decrease the number of years that they would spend in cleaning up that facility. It is a long period of time.

Senator GORTON. Has GAO independently of DOE come to any judgments with respect to the relative priority by reason of danger or threat or the like in connection with cleanup at sites across the country and particular types of waste in given sites?

Mr. FULTZ. We have received the Department of Energy's preliminary assessments and their overall prioritization of 155 locations. We have not studied that in detail. It does appear that they are placing very significant emphasis on public health threat at the facilities. Once they complete the analysis, once they complete the characterization, then we will be in a better position to make a judgment.

I think it is regretful, but I have to say at this time, I am not sure the Department of Energy knows the true extent of contamination, how serious it is or perhaps how close it is to getting into a major aquifer or water supplies.

I think they have a good understanding, but I am not comfortable in saying that they really know how serious the problem is.

Senator GORTON. Thank you, Mr. Chairman.

Senator GLENN. Mr. Chairman, may I ask just one—I am sorry.

Senator EXON. No, go ahead, Senator Glenn. I was just going to introduce the next panel. Go ahead.

Senator GLENN. Just one question. You used the word "institutionalize". This makes people very nervous across country, especially when we talk about setting these sites aside as "national memorials" to what we should have done in the past and did not.

Have you run any studies yet or are there any studies under way you are aware of to analyze what percent or what sites might have to be just institutionalized, immobilized, a fence put around them, a guard on the gate until we figure out what to do, perhaps in the next century sometime?

Mr. FULTZ. There is not, and let me clarify that. When we say irreversibly contaminated and institutional control, we mean that in the sense that we want the Department of Energy to protect the environment, to protect the public from getting into those facilities.

We certainly are not advocating that that is what we do, that we walk away from these facilities. We think every effort should be made to clean up the facilities and to use proper techniques and technologies. I think the seriousness and the extent of the problem in some areas is such that one of the major plans the Department of Energy currently has is to somehow solidify that waste, stabilize it, monitor it and make sure that it does not migrate into the water tables.

Senator GLENN. At some of these sites, where, for example, there has been a hot reactor for the last 30 years or so, to dig that site up and try by robotics or some other means to demolish it, package it, cart it across country, and put it someplace else may endanger more hundreds of thousands or millions of people than it would just to build a fence around it, shut it down and leave it where it is. I can see that happening, but nobody has done a real study on that yet. That is the point.

Senator EXON. Senator Kennedy.

Senator KENNEDY. I understand you have two new production reactors, one of which is on the drawing boards for Idaho, and then you have the SIS. Is that correct?

Mr. FULTZ. That is correct.

Senator KENNEDY. Then you have Savannah River. So basically we are talking about three different facilities.

Mr. FULTZ. Yes.

Senator KENNEDY. For production of tritium and plutonium.

Mr. FULTZ. That is correct.

Senator KENNEDY. So in your earlier comments you were addressing the general issue of the production facilities and the priorities at least as you perceive it with regard to plutonium and tritium?

Mr. FULTZ. Yes.

Senator KENNEDY. Just a final question. Does GAO agree with Bruce Diamond, who said yesterday that there are no immediate threats to public health that are not being dealt with in the current budget?

Mr. FULTZ. I would say given that DOE is still in the study phase, still in the characterization phase, I would not be comfortable making that statement for myself.

Senator KENNEDY. I can tell from your answer you are probably reluctant to try to expand on that, but I do not know whether you would want to give us something more in addition for the record on that, or do you want to just expand on why?

Mr. FULTZ. What we could do is provide reports that we have issued on the extent of contamination within the complex. In some cases the contamination is literally thousands of times drinking water standards and other standards, and the concentrations are very severe.

We could provide those reports to you, but again I think the Department has readily admitted that they are still characterizing, still determining the true extent of contamination.

Senator KENNEDY. Mr. Chairman, could we work out with staff an appropriate kind of elaboration in terms of the record?

Senator EXON. Would you please advise us for the record——

Senator KENNEDY. It is something I would be very interested in. I do not want to overload the record with material that has gone to other committees, but I think it is important in terms of this hearing, too. I will ask staff to work out with you an appropriate kind of response.

Thank you, Mr. Chairman.

[The information follows:]

GAO would have difficulty stating with complete confidence that there are no immediate threats to public health that are not being dealt with in the current budget. In our judgment, such a statement would have to at a minimum be caveated to reflect that it is based on current information which is not complete, and in some instances, may be flawed.

As I stated in my testimony, DOE is still characterizing the extent of the contamination at most sites. For example, about 60 percent of the fiscal year 1990 budget for cleanup is for paper studies to continue studying the extent of contamination. Further, while we have not reviewed them all, the DOE Environmental Survey Preliminary Reports for several weapons complex sites that we have looked at state that ". . . a complete understanding of the significance of some of the environmental problems identified requires a level of study and characterization that is beyond the scope of the survey." This raises questions concerning whether DOE knows where all the problems are and where the contamination might have migrated to.

I also pointed out at this and other hearings in the past few weeks that the monitoring data on the contamination at some DOE facilities may be flawed. For example, according to DOE's own Environmental Survey Preliminary Reports, there are insufficient wells at some locations to monitor the movement of contamination. Another example, taken from the Report on the Feed Material Production Center in Ohio, states that "the consistency and accuracy of environmental monitoring data may be inadequate because there are no formal sampling and analysis quality assurance practices and procedures."

Senator EXON. Thank you, Mr. Fultz, and thank you, Ms. Jones and Mr. Fenzel for being here this morning. You have given very good testimony, and we hope you can respond quickly to the other questions that will be submitted to you in writing and also to follow up on other things that we have asked the staff to cooperate on that have come out in the hearing this morning.

You are excused. Thank you.

Mr. FULTZ. Thank you.

Senator EXON. We now call our next panel, Mr. Dan W. Reicher and Mr. James D. Werner on behalf of the Natural Resources Defense Council.

Mr. Reicher, I believe that we will start out with you this morning, so please proceed.

STATEMENT OF DAN W. REICHER, SENIOR ATTORNEY, NATURAL RESOURCES DEFENSE COUNCIL, ACCOMPANIED BY JAMES D. WERNER, PROJECT ENGINEER, NATURAL RESOURCES DEFENSE COUNCIL

Mr. REICHER. Thank you very much, Mr. Chairman. Good morning, Senators.

Senator EXON. Let me say that your full statement is accepted for the record without objection, and we ask you to summarize.

Mr. REICHER. Thank you very much.

My name is Dan Reicher. I am a Senior Project Attorney with the Natural Resources Defense Council. Prior to this position I was an Assistant Attorney General for Environmental Protection in the State of Massachusetts, a staff member of the President's Commission on the accident at Three Mile Island, and a legal assistant in the Department of Justice Hazardous Waste Section.

Accompanying me today is Mr. Jim Werner, who is a Project Engineer with the NRDC. Prior to his appointment at NRDC Mr. Werner was with the ICF Corporation where he was a consultant to the Department of Energy for a number of years on waste cleanup. He has spent almost 10 years in the hazardous waste business and has a master's in environmental engineering from Johns Hopkins.

NRDC is an environmental organization with about 100,000 members, and we have worked in the area of the Department of Energy Nuclear Weapons Complex for a number of years.

Mr. Chairman, yesterday DOE tried to put the best face it could on an environmental problem that makes the Alaskan oil spill look rather insignificant. DOE told us that they have made substantial progress in cleaning up the Nuclear Weapons Complex; that cleanup costs may be less than actually predicted; that the Department could not use any more money from Congress than that what it has requested in the fiscal year 1990 budget; bascially, that things are under control.

Our message today is quite different. Unfortunately, things are not yet under control.

Admiral Watkins' take-charge style is certainly a refreshing break from the past, but it simply cannot by itself halt the contamination of precious water supplies, clean up over 3,000 waste sites, or decontaminate and decommission hundreds of buildings and scores of reactors.

In recent hearings DOE has made a series of claims about its environmental programs. Today we would like to take a few minutes to respond to some of those claims.

The first claim that we have heard recently is that cleanup costs are overestimated and that new cleanup technologies over time will reduce those costs. This is a grave misconception, and the best way to prove that is to look at the Superfund program.

Between the years 1984 and 1988, the number of sites addressed by the Superfund program increased from 2,000 to 10,000, and we believe that similar sorts of things could happen in the weapons complex. At Hanford alone, just a few years ago DOE was saying they had a few hundred sites to clean up. Now that number has reached 1,500.

Second, as time goes by contamination gets worse. That is a very essential point. The longer we wait to clean up this problem, the more costs will increase.

When I worked at the Justice Department I was assigned a little case called the Lipari Landfill up in New Jersey. It paled in comparison 10 years ago to the Love Canal in New York State and the Stringfellow Pits out in California. Today, 10 years later, that landfill is ranked number one on EPA's Superfund list, potentially the worst commercial hazardous waste site in the United States.

The point is that as you get more information, the problem often looks worse and not better.

Third, remedies cost a lot more than originally thought. EPA was predicting $8 million per site for cleanup in 1984 in the Superfund program. That cost is now up to $20 million.

This claim about new technologies reducing costs, in fact it is quite the opposite. What we see is that when you use new and better treatment technologies, they often cost more.

Generally, DOE has been cleaning up sites by putting a clay cap over them so that rain does not infiltrate and carry contaminants down to the ground water.

A much better way to clean up sites is to actually remove the contamination, but to do that you are talking about a lot more money than simply installing a clay cap.

Senator KENNEDY. And put it where?

Mr. REICHER. That is a very good question, Senator.

Mr. WERNER. You do not necessarily have to exhume the waste. Sometimes you can treat it in place and eliminate the toxicity or remove the waste portion of it.

Mr. REICHER. There are ways to actually evaporate the contaminants that are in a waste site and remove them and filter them. That is better than putting a clay cap over it and leaving it.

So the claim about cleanup estimates being too high just is not supported by the Superfund program.

The second claim, that funding is adequate in the fiscal year 1990 budget, that is the most troubling claim to us. DOE yesterday touted the fact that they were spending $3.1 billion for environmental activities in the fiscal year 1990 budget but really neglected to say that almost half that amount is for what is called the base program. The General Accounting Office does not include this base program in its $100 to $130 billion estimates. GAO does not include the base program because it is "a normal cost of doing business that would be necessary whether or not DOE had any problems." The point is that a good share of that $3.1 billion is spending that they would have to do anyway even if they had no problems.

So what we are really looking at and the figure that we really have to focus on in the fiscal year 1990 budget is $372 million that has been proposed for the actual cleanup of 3,000 waste sites, just 4 percent of the overall fiscal year 1990 budget request for weapons production and less than one-half of 1 percent of what it is going to take to clean up the weapons complex. We are looking at cleanup costs of $50, $75, $100 billion. That is not the way you go about addressing a problem.

DOE would have us believe that there is simply nothing it could possibly be doing in fiscal year 1990 to clean up environmental problems beyond what is already proposed, but that is simply not the case.

We have already heard this morning from Senator Glenn, who talked about a large number of projects that are going begging, those identified by the EPA. We are preparing an analysis that we hope to submit in a few weeks that will allow us to add to that list.

For now, let me mention some general areas in need of additional funding.

First, DOE is not spending enough money on what are called interim remedies. These are cleanup actions that can be taken right now to halt or slow the speed of contamination and thereby reduce risk as well as save money.

EPA has learned the usefulness of interim remedies in the Superfund program. An example is something called "counterpumping" used to halt or slow the spread of contaminated groundwater. Another example is the selective removal of hot spots of contamination.

The Times Beach, Missouri cleanup problem was very famous in the news a few years ago. The mistake made there was instead of removing the dioxin contaminants when it was restricted to ditches and a small area, it was left. A flood hit the town and spread the contamination all over the community and as a result the entire community had to be abandoned and the homes bought out.

The point is that it is possible to go in and do specific things at sites that will reduce costs and halt or slow the spread of contamination. These interim remedies should take place now. One important caveat, though, is that these interim remedies cannot substitute for permanent remedies.

Our second point is that DOE is not spending enough on environmental monitoring—groundwater monitoring wells in particular. Groundwater contamination is one of the worst problems at these DOE facilities. DOE is predicting that there could be literally thousands of groundwater monitoring wells that have to be installed. The average hazardous waste site needs at least three wells, and sometimes there can be dozens required. At Hanford where there are 1,500 waste sites, DOE only plans to install over the next few years 50 monitoring wells a year. At that rate it could take several decades or more just to install the necessary monitoring wells, to say nothing of actually cleaning up the sites. They have to be installing monitoring wells on a much quicker basis.

DOE is not spending enough money on waste management facilities. DOE is going to need significant new waste management facilities to deal safely with the waste that it is currently generating and that it has been storing.

For example, at the Idaho facility there is a need to build a facility that can glassify, actually turn into glass, the high level nuclear wastes that are being stored. Under DOE's present planning, however, they will not even begin construction of that facility until after the year 2000. That facility should be built much more quickly. This is just another example of where additional funds can be spent.

Fourth, DOE is not spending enough money in laboratory capacity. If we are going to get at this problem, we need adequate laboratory capacity. We need to be able to analyze the samples that are collected and perform other monitoring in a reliable manner. Our experience has been that DOE simply does not have the necessary equipment and personnel it needs to do that.

I am using Hanford as an example, because it is probably one of the worst sites. At Hanford, DOE does not even expect to even complete the characterization of the high level waste tanks until close to the year 2000, in part because of lack of laboratory capacity. If DOE installed laboratory capacity now, it could expedite the characterization of those waste tanks and therefore speed the cleanup.

Fifth, DOE is not spending enough money on quality assurance and quality control. This is the system that you use to ensure that environmental monitoring data is reliable. The quality assurance and quality control programs were found to be deficient by the GAO as well as in our experience.

DOE needs to devote substantial additional resources to quality assurance and quality control if we are to gather data that we can rely on in assessing the problem and developing solutions. There are serious concerns now about the quality of the data that DOE is deriving from its monitoring, which must be improved. To do that we need additional funds.

Sixth, DOE is not spending enough money on decontamination and decommissioning. Senators, this is perhaps the real sleeping giant in the weapons complex. Decontamination and decommissioning means cleaning up the literally hundreds of radioactively contaminated buildings and structures at these facilities.

For example, at the Idaho facility alone there are between 50 and 60 nuclear reactors. At the Mound facility in Ohio, a building that was built for $2 or $3 million is now predicted to cost $400 million to decontaminate and decommission. There is a half-mile long building at Oak Ridge called the K-25 building which could cost over $1 billion to decontaminate and decommission.

So let us look at what DOE is spending in fiscal year 1990 on this: $29 million. This is simply not adequate. It could take hundreds of years at that rate to decontaminate and decommission these buildings and structures.

So that is really the sleeping giant in all this, and we really need to be pumping a lot more money into decontamination and decommissioning.

DOE is also not spending enough money on research and development or waste treatment, cleanup and minimization. There are research and development programs to treat or detoxify waste that could be undertaken today on a trial basis which are not being funded. There is also research and development work which is not being funded which would actually reduce the amount of waste DOE produces in the first place. A critical lesson the commercial industry has learned, is to reduce the actual production of waste in the first place. There are a lot of good new technologies that are being used. But, DOE is not putting sufficient money into research and development on this important area of waste reduction.

Finally, just an additional point, more money is needed for the EPA to oversee these facilities. Without adequate funding for regulatory agencies like EPA, many cleanups will be delayed due to backlogs in review and approval.

Let me give you an example of the Rocky Flats plant. EPA Region 8 has stated that it will need to triple its Federal facility oversight staff just to keep up with its oversight of the Rocky Flats plant in Colorado.

I can tell you from personal experience working with the State agency in South Carolina that they are extremely understaffed, underfunded and really having a very difficult time keeping up with the regulation of the Savannah River plant. You need a lot more money for the States and for the EPA to really oversee these facilities.

The next claim is that a proper balance is being struck in the 2010 Report between cleanup and production. The spending scheme in the 2010 Report shows serious imbalance between cleanup and production. DOE plans to fully modernize the weapons complex at a cost of $52 billion over 20 years. That would satisfy 100 percent of its needs. In contrast, cleanup over the same period of time would get just $29 billion and would satisfy less than 50 percent of needs.

The bottom line is that environmental programs are taking a back seat to production in both the fiscal year 1990 budget and over the long term in the 2010 Report. This is the same inappropriate balance that brought us the immense problems we face today. This simply has to change.

The new operating principle must be that we clean up the weapons complex at least as swiftly as we modernize it. In order to accomplish this task, two things have to happen. First, spending must be increased substantially in fiscal year 1990 to begin to halt the spread of contamination.

Second, over the next few years cleanup funding over and above the base program is going to have to be ramped up substantially from less than $200 million in fiscal year 1989 to $3 to $4 billion annually or more by 1993 or 1994. The mathematics alone dictates this. If you are looking at a clean up of $60 or $80 billion and you want to do it in 20 years, simple division would indicate that we are going to have to be spending in the $3 or $4 billion per year range if we are going to get to this.

The big question is where this money is going to come from. We believe that the first place to look for it is in the lower priority weapons production projects that DOE has in its budget. From this committee's perspective it would seem that ensuring a safe and adequate source of tritium over the next several years and the capacity to recycle existing supplies of weapon grade plutonium should be a considerably higher priority than new production initiatives to produce additional weapons grade plutonium and highly enriched uranium.

If there is to be adequate funding for cleanup and important production initiatives, therefore, Congress must cut or at least defer lower priority weapons projects. There are a number of such projects: the modernization of plants that DOE is intending to close in the near future; development of nuclear directed energy weapons; the building of a second new production reactor; startup of highly enriched uranium production at Oak Ridge which has not occurred since 1964; and construction of the SIS plutonium plant.

The SIS plant whose sole product would be weapons grade plutonium is the quintessential example of a project that can be cut or at least deferred. Mr. Chairman, you recognized this recently in a letter I received from you just yesterday in which you said, "Given the massive cleanup effort we are facing and the pressing need to move on to a safe, reliable source of tritium, the SIS project may not be of such a high priority at this time." That is clearly, I think, the proper and appropriate position to take on this facility. We simply do not need to be committing to construction of this plant in fiscal year 1990 given the adequacy of our plutonium supplies and given the greater needs for tritium production and the greater needs for cleanup.

Just this morning, whatever remaining justification for the SIS plant that might exist was further eroded with Secretary Gorbachev's important announcement that the Soviets were halting the production of highly enriched uranium and phasing out plutonium production reactors.

I just got this by FAX from London, and I will read it to you. "I take the opportunity to inform you of our decision taken recently to cease production as of this year of enriched weapon grade uranium. In addition to the industrial reactor for the production of weapon grade plutonium which was shut down in 1987, we are planning to shut down two other such reactors this year and next year without commissioning new units to replace them. This is yet another major step toward the complete cessation of production of fissionable materials for use in weapons." That was Secretary Gorbachev's statement today in London.

The Soviets are moving toward a cessation in the production of fissionable materials, plutonium and highly enriched uranium, and we can do the same thing in this country. It would be wise that we consider entering into a bilateral agreement with the Soviets to do so and in that way eliminate the need for new production facilities and thereby increase funding for cleanup.

Just in the case of the SIS plant, we could free up $200 million alone in fiscal year 1990 if we were to cease development of that plant and $2.5 billion or more over the life of the plant.

In conclusion, cleaning up the weapons complex is going to require an unprecedented level of commitment on the part of the DOE and Congress. DOE is going to have to attack the cleanup problem with the same resolve that it is displaying in building new weapons plants.

Congress is going to have to dig deep to find the tens of billions of dollars required. Failure to attack the problem now with substantial resources will not only place human health and the environment at increasing risk but will also push cleanup costs up substantially.

Thank you.

[The prepared statement of Messrs. Reicher and Werner follows:]

STATEMENT OF

DAN W. REICHER, ESQ.

AND

JAMES D. WERNER

ON BEHALF OF

THE NATURAL RESOURCES DEFENSE COUNCIL

My name is Dan W. Reicher. I am a senior project attorney with the Natural Resources Defense Council (NRDC). Prior to joining NRDC, I was an assistant attorney general for environmental protection in the Commonwealth of Massachusetts, a law clerk to a federal district court judge, a staff member of the President's Commission on the Accident at Three Mile Island, and a legal assistant in the hazardous waste section of the U.S. Department of Justice. I am a graduate of Stanford Law School and Dartmouth College.

Appearing with me today is Jim Werner, who is a project engineer with NRDC. Prior to joining NRDC this year, Mr. Werner was a Senior Environmental Engineer at ICF Technology, Inc. At ICF, Jim was a consultant to the Department of Energy on the Environmental Survey Project, which was a project designed to establish a baseline inventory of the Department's environmental problems. As part of that project Jim had a leading role in the Survey Prioritization Implementation Group. That group helped plan the implementation of the model used in the September 1988 Environmental Survey Preliminary Summary Report, which ranked environmental problems at DOE facilities. Jim has a Masters degree in Environmental Engineering from the Johns Hopkins University and has authored numerous technical and policy articles on the costs and technologies of hazardous waste cleanup.

NRDC is a national environmental organization with more than 100,000 members and contributors and a staff of about 120 lawyers, scientists, resource specialists and support personnel at offices in New York, Washington, and San Francisco. NRDC pursues a broad range of environmental, energy, and defense issues. The organization has long been concerned about safety and environmental problems at Department of Energy (DOE) nuclear facilities. Over the past twelve years, the NRDC Nuclear Project has won a series of lawsuits to enforce federal environmental laws at DOE facilities including Hanford, Washington; Oak Ridge, Tennessee; and the Savannah River Plant, South Carolina.

We are pleased to have this opportunity to present our views to the Subcommittee on the Department of Energy's (DOE's) program for addressing environmental problems at its nuclear weapons facilities. Our testimony will be divided into two parts. First, we will address the magnitude of the environmental problems at DOE facilities, and how DOE is budgeting for their resolution relative to weapons production activities. Second, we will address DOE's management of its environmental cleanup program. Specifically, we will present preliminary results of our analysis of the problems with DOE's process for setting priorities in its cleanup program. In addition, we will comment on inadequacies in the quality of data used for planning cleanup projects, the use of interim remedies to expedite the cleanup process, and the impact of interagency agreements on the DOE's cleanup priorities.

SUMMARY

The tremendous environmental problems at DOE facilities, resulting from decades of neglect and mismanagement, have left taxpayers with a cleanup and compliance bill that could exceed $100 billion. By placing a dollar figure on cleanup and compliance, DOE has forced Congress and the public to confront the real cost of producing nuclear warheads -- beyond the more than $250 billion already spent since World War II. Developing a sound legislative response to DOE's costly environmental problems -- and striking a proper balance with the Department's weapons production activities -- must be a top Congressional priority.

The current proposed DOE budget fails to direct adequate funding for this long overdue cleanup. Just 4 percent of DOE's $9.4 billion budget is earmarked for actual remedial action at the Department's 3,000 waste sites. And the long-term spending scheme outlined in the Department's December, 1988 Modernization Report is similarly inadequate, providing less than half of total cleanup needs over the next 20 years while allocating 100 percent of needs to weapons production.

Congress must work with DOE to strike a more appropriate balance that will assure that cleanup is accomplished at least as swiftly as new production initiatives. With a static defense budget this will mean that some cleanup funds will have to come at the expense of lower priority production initiatives. From the perspective of this committee it would seem that ensuring an adequate supply of tritium over the next several years and an adequate capacity to recycle safely the existing supply of weapon-grade plutonium in warheads and scrap are of considerably higher priority than new production initiatives to obtain additional weapon-grade plutonium and highly enriched uranium (HEU). Therefore, if there is to be adequate funding for cleanup and higher priority production activities, Congress should cut or defer lower priority production activities, including, but not limited to, restarting HEU production at Oak Ridge and building the SIS plutonium plant in Idaho.

The second half of our testimony addresses problems with DOE's management of environmental problems. DOE uses a model called the Multimedia Environmental Pollutant Assessment System (MEPAS) in setting cleanup and budget priorities. The results of MEPAS are the basis for the DOE's prioritization report, released in December, 1988, which ranks the severity of the health and environmental threats at the weapons plants. They are also the primary input to the Program Optimization System (POS) which underlies DOE's FY90 budgeting.

We find that the MEPAS model is seriously flawed. MEPAS is too complex and data intensive thereby requiring an excessive number of assumptions rather than real-world data. The model also relies on methods that are inconsistent with standard risk assessment procedures. Moreover, MEPAS was never subject to outside public review in contrast with ranking models issued by the Environmental Protection Agency and the Department of Defense.

In view of these serious flaws, MEPAS, should not be used for establishing cleanup priorities or as an input to POS for setting budget priorities. Congress should direct DOE to suspend using MEPAS. DOE should use EPA's priority-setting model for ranking its waste sites. Other DOE environmental problems should be addressed through existing EPA and state regulatory structures.

We have three additional concerns with the management of environmental problems in the weapons complex. First, the environmental monitoring data DOE is collecting is, to some extent, unreliable. Observers of DOE's environmental monitoring program, including GAO, have criticized DOE's quality assurance/quality control procedures, as well as sampling and analysis procedures. DOE must improve these functions in order to ensure that environmental problems are adequately assessed, proper cleanup priorities are set, and adequate remedies are undertaken.

Second, DOE is giving insufficient attention to interim remedies which can halt or slow the spread of contamination and thereby reduce risk and save money over the long run. Interim remedies include, for example, "counterpumping" to slow the movement of contaminated ground water and "hotspot removal" to eliminate the most concentrated sources of contamination in soil. Congress must ensure that DOE uses interim remedies wherever possible but that they not substitute for permanent remedies.

Third, we are concerned about the interagency agreements that DOE and EPA are negotiating at some of the weapons plants pursuant to the Superfund law and other authorities. The interagency agreement process is increasingly being used to override the requirements of another federal hazardous waste law (the Resource Conservation and Recovery Act (RCRA)) and thereby sanction RCRA violations. Also, in the interagency agreements DOE is making multi-year commitments to spend billions of dollars for cleanup and state oversight that have neither OMB's blessings nor Congressional approval. Additionally, the agreements are sanctioning foot-dragging by DOE in carrying out critical cleanup activities. Finally, the agreements are generally not addressing decontamination and decommissioning of contaminated buildings and structures.

To address these and other concerns about DOE's management of its environmental problems, the Committee should support H.R. 765, recently introduced by Representative Dingell (D-MI). The bill would establish a special temporary Commission to review and make recommendations about cleanup of DOE facilities. The Committee should also support H.R. 1056, recently introduced by Representative Eckart (D-OH) which would improve EPA, state and citizen implementation and enforcement of RCRA at federal facilities.

I. BUDGETING FOR DOE ENVIRONMENTAL AND PRODUCTION INITIATIVES

A. DOE and GAO Reports Estimating Cleanup and Compliance Costs

Over the past year the Department of Energy (DOE) and the General Accounting Office (GAO) have released reports[1] [2] [3] [4] estimating that environmental cleanup and compliance activities at DOE's nuclear weapons production complex could cost in excess of $100 billion.[5] A DOE report released in July, 1988, estimates that the bill for cleanup and compliance could be $66 to $110 billion.[6] The General Accounting Office (GAO) estimates that DOE cleanup and compliance costs could be higher still: $100 to $130 billion, or $1.6 to $2.1 million for every nuclear warhead the United States has produced.[7] Subsequent DOE reports contain similar estimates, making it clear that environmental cleanup and compliance at DOE's nuclear weapons production complex is one of the most expensive environmental projects facing the nation.

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[1] Department of Energy, "Environment, Safety, and Health Needs of the U.S. Department of Energy, Volume 1: Assessment of Needs" (DOE/EH-0079), December 1988.

By placing a dollar figure on cleanup and compliance, DOE has forced Congress and the U.S. public to confront the real cost of producing nuclear warheads--beyond the more than $250 billion already spent since World War II. Developing a sound legislative response to DOE's costly environmental problems -- and striking a proper balance with the Department's current and proposed weapons production activities -- must be a top priority of the Senate Armed Services Committee and Congress.

DOE's most up-to-date and comprehensive estimate of the cost for the entire cleanup and compliance job at the weapons complex is contained in the December Needs Report. This report estimates that the total bill for cleanup and compliance will be $48 to $86 billion, plus an additional $1.4 billion annually to cover the "base" environmental program. The DOE and GAO cost estimates are summarized in Table I.[8]

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[2] Department of Energy, "United States Department of Energy Nuclear Weapons Complex Modernization Report: Report to Congress by the President," December 1988.

[3] Department of Energy ""Environment, Safety and Health Report for the Department of Energy Defense Complex,'' July 1, 1988,

[4] General Accounting Office, "Dealing with Problems in the Nuclear Defense Complex Expected to Cost Over $100 Billion," GAO/RCED-88-197BR, July 1988.

[5] All figures are in FY 1990 dollars unless otherwise indicated.

[6] Supra note 3, at 35. The $66 to $110 billion includes $26 to $40 billion for environmental base program activities.

[7] GAO/RCED-88-197BR, July 1988, at 6.

[8] The components and magnitude of these cost estimates are explained in the NRDC report, "One Hundred Billion Dollars and Counting: A Primer on the Costs of Cleaning Up the DOE Nuclear Weapons Production Complex", by Dan W. Reicher and Jason Salzman, Natural Resources Defense Council, March 1989.

Table I

DEPARTMENT OF ENERGY CLEANUP AND COMPLIANCE COSTS*

Cleanup or Compliance Activity	Estimated Cost	
	DOE	GAO
Corrective Action	6-14	20
Remedial Action	35-63	35-65
Radioactive Waste Management	4-5	30
Decontamination/ Decommissioning	3-4	15
TOTAL	48-86	100-130
Base Program (annual cost)	1.4	__**

* In billions of FY 1990 dollars

** GAO does not include base program funds in its estimate because it considers them a "normal cost of doing business that would be necessary whether DOE had any problems or not."[9]

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[9] GAO/RCED-88-197BR, July 1988, at XXX.

B. Cleanup Costs in Perspective

There are many factors which could cause these cleanup estimates to rise. First, the nature and extent of many cleanup problems as well as their solutions are unclear. Second, the cleanup problems at many waste sites worsen each day as contaminants continue to migrate into soil and water. Third, according to GAO, some sites may require "long-term institutional care" because of the difficulty of remediation. Costs could accrue essentially forever at these so-called "national sacrifice zones."

Fourth, Congress, EPA, and the states may strengthen environmental laws and regulations over the next decade, driving up cleanup costs. For example, EPA may soon impose stricter closure standards under the Resource Conservation and Recovery Act (RCRA) for old waste sites. Also, soil contamination standards, similar to those now in effect in California, may be adopted by other states.

Fifth, ongoing health studies of DOE workers and individuals living around weapons plants may reveal health problems attributable to DOE or contractor operations. If the liability for such problems flows to the federal government, huge costs could result.

Finally, experience with commercial waste sites as well as DOE construction projects suggests that the current cleanup costs may have been underestimated. EPA's estimate of the cost to clean up a commercial Superfund site has more than doubled in five years, from an average of $8.1 million in 1984[10] to $20 million today.

DOE's track record in predicting costs is even worse. In 1988, the House Appropriations Subcommittee on Energy and Water Development determined that 21 major DOE construction projects had, on average, increased in cost by nearly 500 percent from the time they were initiated until the time they were completed or abandoned. The subcommittee concluded that DOE's estimates for new construction projects "must be challenged in light of the Department's past competence in estimating the cost of and managing the construction of major projects."[11] A 500 percent increase in total DOE cleanup costs would leave taxpayers with a bill of about one-half a trillion dollars!

Whatever the precise figure, DOE's bill for environmental cleanup and compliance is staggering. Even if the cost is half of the lowest current estimate, it would still make small change of "expensive" federal projects like the $5 billion Superconducting Supercollider. And if the cleanup and compliance bill is indeed $100 billion--a reasonable estimate based on DOE and GAO figures--it would equal the Office of Technology Assessment's projection for cleaning up all commercial Superfund sites. And it would be more than the total amount spent to put a man on the moon in the Apollo space program. At $250 billion, cleanup would require about $2,800 from each U.S. family. And at $500 billion, it would exceed what the United States spent on the Vietnam War.

C. DOE's Funding Plans are Inadequate

Whatever the exact costs for cleanup and compliance, it is clear that current DOE funding plans for these activities are inadequate. The Bush Administration's Fiscal Year 1990 budget request for DOE's nuclear weapons production activities is about $9.4 billion. Of this, just $372 million, or some 4 percent, is earmarked for actual remedial action at DOE's 3,000 waste sites. While this is a $81 million increase over the Reagan Administration's request and a $230 million increase over the current level of funding, it falls far short of what is needed. Assuming DOE's $65 billion estimate for remedial action and the proposed $372 million funding level, it will take about 175 years--or until the year 2165--to complete remedial action.

DOE's response to its decontamination and decommissioning needs is also totally inadequate. Just $29 million is allocated to these activities in DOE's proposed FY90 budget. At this spending level, decontamination and decommissioning projects will take over 135 years--or until the year 2125--assuming the Department's $4 billion estimate for this work. And it should be noted that unlike GAO, the Department does not include in its estimate the cost of decontaminating and decommissioning buildings currently in use. As Raymond Berube, DOE Deputy Assistant Secretary for Environment admitted at a recent Senate Armed Services Committee hearing, "Clearly our needs exceed what's in the Fiscal 1990 budget request."

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[10] U.S. EPA, Section 301(a)(1)(C) Report to Congress. December 10, 1984. See Environment Reporter "Superfund Needs Added $12 Billion If Program's Scope is Not Enlarged, EPA Says." December 14, 1984. at 1371.

[11] U.S. House of Representatives, Appropriations Committee Subcommittee on Energy and Water Development, Report (100-618), May, 1988, p. 55.

Over the long run, DOE's plans for meeting projected cleanup needs are equally inadequate. Under the spending scheme outlined in the Modernization Report, the weapons complex would be fully modernized over 20 years at a cost of $52 billion above current funding levels. By contrast, the Modernization Report provides only a $29 billion increase above current funding levels for remedial action and decontamination and decommissioning. And this increase would only pay for less than half of the cleanup funding that DOE projects it will need.[12] Thus the Modernization Report makes clear that cleanup activities will continue to take a backseat to weapons production over the next two decades.

DOE's half-hearted commitment to cleanup was explained at a recent Senate Armed Services hearing where DOE officials testified that they selected the funding levels for remedial action and decontamination and decommissioning based not on a detailed assessment of site-by-site requirements through the year 2010, but instead on how much money might be available. With this extraordinary admission, DOE revealed that the Modernization Report is really little more than a wish list of weapons production projects with budget leftovers for cleanup.

And, in fact, even the inadequate, fiscally-driven cleanup funding levels set in the Modernization Report may not themselves be met. DOE admits in the Modernization Report that "[w]hile the budget for Fiscal Year 1990 will be generally consistent with this Plan, accomplishing all recommendations of the Plan in the timeframe specified will require resources greater than those now expected to be available in future years."[13]

This is an understatement if the recent battle between DOE and the Office of Management and Budget (OMB) is any indication. Last December, former DOE Secretary Herrington wrote to former White House Chief of Staff Kenneth Duberstein seeking more money for DOE environment, safety, and health programs, after OMB apparently refused an appeal by the Secretary for increased funds. The letter illustrates how DOE environmental, safety, and health costs have squeezed the Department's budget:

> I must in good conscience advise you that ... the [weapons production] system will, in all likelihood, be operating beyond the bounds of acceptable risk.... If available funding is used for production, then unresolved environmental and safety issues are likely to lead to further shutdowns in the weapons complex. If available funds are devoted to environment and safety, then production goals will not be satisfied.[14]

Duberstein refused to grant the increase, directing Herrington instead to make up the shortfall from DOE's own budget.

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[12] Assuming the total bill for remedial action and decontamination at the complex is $65 billion, as estimated in the December "Needs" report and DOE spends $32 billion on these activities over the next two decades ($29 billion plus $3 billion cumulative current funding), as outlined in the Modernization Report, more than half the cleanup job would still remain in the year 2010. Under GAO's estimate of $80 billion, cleanup would be only slightly more than one-third complete by this date.

[13] Modernization Report, at iv, (emphasis added).

[14] Cass Peterson, "Energy Secretary Warns of New Arms-Plant Cuts," Washington Post, December 18, 1988, at 1.

D. Congress' Response to DOE Environmental Problems

In developing a comprehensive legislative approach to environmental problems at the weapons complex, Congress must make the following assumptions. First, DOE cleanup and compliance costs will, over the next several decades, constitute a major new element in DOE's budget requiring substantial funding. Second, as explained above, the cost of cleanup will rise over time, especially if stabilization and remedial work is not begun immediately. Third, cleanup should be accomplished at least as swiftly as modernization of the weapons complex, and thus spending must be ramped up substantially over the next few years. Finally, the overall defense budget (the "050" account), from which funds for cleanup and compliance will come, will likely remain static in real terms. Operating under these assumptions, there are a number of important steps Congress must take in order to secure adequate funding for cleanup and compliance.

1. Congress Must Halt Lower Priority Weapons Projects.

First and foremost, Congress must scrutinize the Department's budget to a degree it has never done before and root out lower priority production activities. The Modernization Report indicates that DOE is unwilling or incapable of accomplishing this task. From the perspective of this committee it would seem that ensuring an adequate supply of tritium over the next several years and an adequate capacity to recycle safely the existing supply of weapon-grade plutonium in warheads and scrap is of considerably higher priority than new production initiatives to obtain additional weapon-grade plutonium and highly enriched uranium (HEU). Therefore, if there is to be adequate funding for cleanup and higher priority production initiatives, especially in an era of static defense budgets, Congress should cut or defer lower priority production activities.

There are a variety of lower priority nuclear weapons projects in DOE's FY 1990 budget request, including, but not limited to, development of nuclear directed energy weapons, modernization of the Fernald, Ohio weapons materials facility, and construction of the SIS plutonium plant in Idaho.

For example, DOE could save about $115 million in FY 1990 alone by halting or deferring construction of the multi-billion dollar Special Isotope Separation (SIS) plutonium plant proposed for construction in Idaho. Last year, the House and Senate wisely put the brakes on DOE plans to construct the SIS plant, which would refine plutonium for use in nuclear weapons and could cost $3 billion or more to develop, construct, and operate. Serious concerns were raised about the need for and technological-readiness of the laser-based facility proposed for construction at the Idaho National Engineering Laboratory. Since the last Congress, the General Accounting Office (GAO) has suggested that Congress reexamine the priority assigned to the SIS project.

The SIS plant would not be capable of producing tritium, but only weapon-grade plutonium, which DOE has admitted is not in short supply. DOE could obtain all plutonium for new nuclear warheads from past production including warhead retirements and scrap recovery. Plutonium from warheads returned under the INF Treaty and future arms control agreements, like START, would further assure a steady supply of plutonium. In addition, DOE has placed an entire reactor -- the N Reactor at Hanford -- on "standby" to produce plutonium or tritium in an emergency. DOE is also accelerating its program to recover weapon-grade plutonium from plutonium scrap generated during the weapon production process, and DOE has proposed to construct one large reactor and four modular reactors to produce nuclear weapons materials, including plutonium. Even a top DOE official recently admitted that the SIS plant is "not designed to meet a well-identified need."[15]

Thus DOE no longer argues that SIS is needed to meet projected warhead production plans. Instead, the Department now maintains that the U.S. should have the plutonium production capacity offered by SIS as a "contingency" -- just in case a need develops in the 1990's. Under this view, if the Soviets suddenly break out of arms control and embark on a massive arms buildup, SIS could provide us with "sprint-surge" capacity to produce plutonium for a corresponding massive buildup of the U.S. nuclear arsenal.

DOE's argument misses three essential points. First, as already noted there are a variety of other sources of plutonium that could be employed in such a situation. Second, the stockpile of fuel-grade plutonium available to be processed into weapon-grade plutonium at SIS is extremely limited -- equivalent to the plutonium recovered from just one to two year's worth of warhead retirements. The only other large source of feed material for SIS is commercial spent nuclear fuel which DOE says it does not plan to process and whose use would have serious proliferation ramifications.

Third, even if the SIS plant could provide large quantities of plutonium, the limiting factor in the ability of the U.S. to "surge" in the event of a Soviet breakout is not the availability of plutonium but rather warhead delivery systems. As the former Chairman of the Economics Department of the U.S. Air Force Academy said recently about SIS:

> [T]his requirement [plutonium surge capability] disappears when one realizes that the U.S. defense industrial base is incapable of surging to provide the delivery systems (i.e., missiles, aircraft, submarines, etc.) to carry the warheads to the Soviet Union. Thus, even if the DOE was successful in increasing the production of weapon-grade plutonium, it could only be stored after production because of a shortage in delivery systems. [citations omitted] .... In addition, a recent report prepared for the Air Force .... states that the economic and technical constraints facing the Soviet Union make any breakout unlikely.[16]

Construction of the SIS facility should be halted not only because of an inadequate justification for the plant but also because the SIS technology is not ready for deployment. The facility is only 30 percent designed. And the novel laser-based technology which underlies the plant has yet to be demonstrated on a production scale.[17] Research and development work has fallen so far behind schedule that the Department will not run the critical experiments needed to determine whether the technology will even work any earlier than Spring 1990. Despite this situation, DOE plans to begin construction of the plant this Spring, thus making SIS a high-risk "concurrent" development project.

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[15] Don Ofte, Manager, Department of Energy Idaho Operations Office, Idaho Falls Post-Register, February 17, 1988, at A-1.

[16] "Review of the Economic Implications of the Draft Environmental Impact Statement on the Special Isotope Separation Project," William J. Weida, March 15, 1988.

Moreover, the safety of SIS has not been assured. Plutonium vaporized in the SIS plant would burn spontaneously if exposed to air. DOE has yet to demonstrate that this and other hazards of operating the novel SIS technology can be controlled. Of particular concern is DOE's failure to complete the Preliminary Safety Analysis Review for SIS. Due to delays in the SIS design efforts and the safety review process, the critical Preliminary Safety Analysis Review for SIS is not scheduled for release until early 1990--about two years behind schedule and nearly a year after DOE plans to begin constructing the facility.[18]

The bottom line is that we can and should defer any commitment to construction of the SIS plant without endangering our ability to deploy a credible deterrent. The need for the plant has not been established and any conceivable justification would evaporate with a START agreement. Moreover, the technology simply is not ready for deployment. There would be much to be gained from a deferral by freeing up funds for cleanup and higher priority production initiatives.

In fact, halting an unnecessary project like SIS would save a total of about $2.5 billion or more over the lifetime of the plant, excluding what has already been spent on research and development. These savings could be used to clean up literally hundreds of waste sites. And it is likely that the savings from SIS would be even greater since, as noted above, the costs of DOE construction projects will likely increase substantially over time. In fact, DOE's cost estimate for the SIS project has already increased by more than 300 percent since the project's inception. The General Accounting Office (GAO) recently warned that "huge cost overruns" may be on the horizon.[19] The GAO later stated before a House Committee that, "questions regarding the emphasis placed on [SIS] need to be addressed."[20]

As Congress evaluates DOE weapons production projects like SIS, it should fully consider the impacts of various arms control agreements. DOE failed to consider arms control in its Modernization Report, despite a prior commitment to members of this committee that such an analysis would be included. The Report merely states that "under most nuclear arms control scenarios, the capabilities of the Complex, both technical and productive, must be maintained," and adds that the capability for "responding to a possible breakout from any arms control agreement" must be maintained.[21] However, the successful negotiation of arms control agreements could eliminate the need for a variety of weapons production projects, especially plutonium-producing plants like SIS, thereby freeing up additional resources for cleanup. Even DOE Assistant Secretary for Defense Programs Troy Wade recently admitted, "Should there be a START agreement and perhaps follow-on agreements where substantial weapons are returned, clearly it [SIS] would be worth revisiting."[22]

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[17] Department of Energy, U.S. Department of Energy Fiscal Year 1990 Congressional Budget Request, Construction Project Data Sheets (DOE/MA-0356), January 1989, p. 310.

[18] Department of Energy, SIS Project Charter Schedule, October 27, 1986; compare with Project Manager's Progress Report, Special Isotope Separation Project, October to December, 1988.

[19] J. Dexter Peach, Assistant Comptroller General Resources, Community, and Economic Development Division, General Accounting Office, "GAO's Views on DOE's Modernization Plan for the Weapons Complex" (GAO/T-RCED-89-5), January 25, 1989, pp. 6, 9.

[20] Testimony of Charles A. Bowsher, Comptroller General of the United States before the House Committee on the Budget, February 8, 1988 at 8.

2. Congress Should Allocate a Larger Percentage of the Overall Defense Budget to Cleanup

Because the money saved from cutting low priority production projects and improving the efficiency of cleanup spending may not cover the full bill, DOE must be given a larger percentage of the overall defense budget for its environmental activities. DOE's staggering environmental problems are primarily the unpaid costs of supplying the Department of Defense (DOD) with warheads over the last several decades. As such, it is reasonable that DOD should shoulder part of the cleanup bill.

In fiscal years 1987 to 1989, DOE received about 2.5 percent of the 050 account to fund nuclear weapons production.[23] With an increase of just one-third of a percent (.33%) in DOE's share of this account, an additional $1 billion could be made available for cleanup and compliance. In this way, the total 050 account would remain unchanged but increased funds would flow to DOE for environmental programs. Congress would have to mandate that all funds generated from such an increase are allocated to cleanup and compliance, and not production activities.

3. Congress Should Direct DOE to Submit a Comprehensive Cleanup Schedule

In order to gauge the success of DOE's cleanup efforts, Congress should direct DOE to prepare and submit a long-term schedule that will achieve substantial cleanup and compliance by the year 2010. The schedule should include specific cleanup and compliance milestones and annual funding requirements. The schedule should reflect all legal requirements and should be updated annually and submitted as part of DOE's budget request. Any delays in reaching previously established milestones should be noted and explained in each annual submission.

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[21] Modernization Report, at 6.

[22] U.S. House of Representatives, House Appropriations Committee, Subcommittee on Energy and Water Development, Part 6, March 21, 1988, p. 1117.

[23] U.S. Senate, Hearing Transcript, Senate Committee on Armed Services Subcommittee on Strategic Forces and Nuclear Deterrence (S. Hrng, 100-790 Pr. 6), March 1988, at 360. DOE's portion of the overall 050 account is designated the 053 account, while DOD's portion is called the 051 account. A small portion of the 050 account is allocated to other federal agencies for activities relating to civil defense, selective service, and the strategic mineral reserve.

4. Congress Should Direct DOE to Clarify Its Budget

DOE's Budget Request has been improved this year, making it easier for Congress and the public to understand what cleanup activities DOE is undertaking. But DOE's improvements have not gone far enough. The Department's budget still does not clearly spell out how much is being spent on what DOE refers to as "Corrective Action" in its Needs Report. Essentially, this category includes upgrades to existing facilities to bring them into compliance with environmental, safety, and health standards. The hundreds of millions of dollars of corrective action funds, which are currently spread out among DOE budget categories entitled "Weapons Activities" and "Nuclear Materials Production," should be consolidated in the budget and the specific projects at each facility listed.

II. PROBLEMS WITH DOE ENVIRONMENTAL MANAGEMENT

For almost ten years, EPA has been cleaning up hazardous waste sites under the Superfund program. The Department of Defense has also been cleaning up sites under its own "Installation Restoration Program"[24] for about a decade. DOE is only now beginning this type of cleanup program. As discussed above, DOE faces a daunting task that will probably dwarf the DOD cleanup program,[25] and be similar in magnitude to the Superfund program for commercial sites. We are concerned that DOE is not currently equipped to meet this immense challenge. In particular, we find that DOE's system for setting cleanup and budget priorities is flawed, the Department is not collecting reliable environmental data, DOE is not making sufficient use of interim cleanup remedies, and the interagency agreements DOE is reaching are inadequate.

A. DOE's System for Setting Cleanup and Budget Priorities Is Flawed

The initial attempt DOE has made to develop an effective system to identify which sites should be cleaned up first and to allocate funding accordingly is seriously flawed. DOE has developed a ranking model, called the Multimedia Environmental Pollutant Assessment System (MEPAS). MEPAS was developed to rank environmental problems at DOE facilities in terms of their severity.[26] MEPAS was the basis for DOE's September, 1988

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[24] Now called the "Defense Environmental Restoration Program"

[25] DOD has estimated the total cleanup costs for its sites to be approximately $13 billion (Environment Reporter, "Defense Department Revises Sharply Upward Estimate of Time, Money Needed for Cleanups," Nov. 27, 1987 at 1780).

[26] MEPAS was developed as a part of the Environmental Survey program, which was one of a number of environmental initiatives announced in September 1985, by then Secretary of Energy Herrington. A second component of the Survey program was field audits of nearly 40 DOE facilities across the country, which resulted in a series of "Preliminary Reports" reviewing environmental problems at each facility. The field surveys cost approximately $6 million and involved five teams with 7 technical specialists each. The third component of the Survey program was sampling and analysis of soil, wastes and water at several DOE facilities visited by the Survey. This component involved dozens of technical specialists from the DOE laboratories and cost approximately $45 million.

Environmental Survey Preliminary Summary Report[27] (released publicly in December) which ranked environmental problems at Defense Program facilities.

DOE developed and implemented MEPAS at a cost of $9 million partly as an alternative to EPA's Hazard Ranking System (HRS). HRS is used for ranking waste sites for listing on the National Priorities List, a list of sites potentially eligible for cleanup funds under Superfund.[28]

DOE has used the results of MEPAS in a system for allocating environmental restoration funds pursuant to a Congressional Committee report on the FY1988 Defense Authorization Act[29]. To accomplish this task, DOE's Office of Defense Programs developed a model to accomplish this task called the Program Optimization System (POS). POS is based on a standard quantitative management tool known as Multiattribute Utility Analysis, which is a technique designed to help with decisions involving multiple competing objectives. DOE used the results from POS in developing its FY90 budget request[30].

Although POS is structurally very different from MEPAS[31], it relies almost exclusively on the MEPAS model for its input to establish the baseline environmental threat posed by existing problems. In fact, the weighting factor assigned in the POS system to "health and safety" was 94 percent. The other two factors considered in POS -- regulatory responsiveness, and public, State and community concern -- were assigned weighting factors of only five percent and one percent, respectively.[32]

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[27] U.S. Department of Energy, Environmental Survey Preliminary Summary Report of the Defense Production Facilities. ES and H Office of Environmental Audit DOE/EH-0072 (September 1988).

[28] It is worth noting that in 1985, DOE developed a variation of the HRS called the "modified Hazard Ranking System" (mHRS)). The purpose of the mHRS was to correct what DOE viewed as the major inadequacy of HRS for use at its nuclear facilities: the failure of the model to consider adequately the characteristics of radioactive substances. The mHRS was an extension of the HRS because, for nonradioactive materials, the two models produced identical results.

[29] Committee on Armed Services, U.S. House of Representatives. National Defense Authorization Act for Fiscal Year 1988/1989. Report on H.R. 1748. April 15, 1987. H.Rep.100-58, pp. 316-317.

[30] "Priority System for Department of Energy Defense Complex Environmental Restoration Program, A Report Prepared for the House Armed Service Committee," U.S. Department of Energy (August 1988), at page 17.

[31] POS differs significantly from the MEPAS model in that it considers other factors in addition to environmental and public health risks. POS also takes into account the need to comply with regulatory and legal requirements, program costs, and public, State and community concerns.

[32] Merkhofer, L. and K. Jenni, A Program Optimization System for Aiding Defense Programs Environmental Restoration Decisions. Applications to FY90 Budgeting: Final Report, Prepared for the DOE Defense Programs Office, Hazardous Waste and Remedial Actions Division, Washington, DC. (August 8, 1988) at page 34.

We have reviewed MEPAS and have identified several technical and policy problems that call into question the validity of using it as a component of any cleanup priority-setting system.

1. MEPAS Cannot Distinguish Near-term Risks from Long-term Risks

A fundamental technical problem with the MEPAS model is its total inability to distinguish near-term risks from long-term risks. DOE stated in its Preliminary Summary report that its model enables the Department to address immediate problems sooner: "the earlier the contaminant can arrive and expose a population, the sooner the environmental problem should be addressed."[33] But this claim is simply not supported by the design of the model. MEPAS only produces a risk estimate at the end of a 70-year (individual lifetime) period. It does not identify risks for periods shorter than 70 years. Instead MEPAS only tells a decisionmaker the particular 70-year period during which the risk posed by a site will be at its highest level. Thus the model is incapable of indicating which environmental problems should be addressed in the next few years compared to those that will need attention several decades from now. This is a serious defect in the model; decisionmakers need to be able to identify changes in the relative risk of sites over time periods far shorter than a lifetime.

2. MEPAS Cannot Identify the Most Exposed Individual

A standard risk assessment tool is to calculate the most exposed individual (MEI) to a given hazard, in addition to determining overall population risks. Using this information a decisionmaker can identify immediate responses to protect individuals at greatest risk as well as long-term needs to reduce risks to overall populations.

MEPAS, however, is incapable of calculating MEI risks. Because MEPAS calculates risk only in 70-year increments it cannot identify more specific risks. A report prepared for EPA criticized the absence of the MEI component: "the absence of exposure and risk estimates to the most exposed individual ... could cause [the model] to underestimate the hazard of a site where risk to the MEI is large but risk to the total population is small."[34] This is a serious defect in a model intended to aid in decisionmaking.

3. MEPAS Uses an Inappropriate Combination of Carcinogenic and Non-Carcinogenic Effects

Another technical problem with the MEPAS model involves its mixing of carcinogenic and non-carcinogenic effects. The scientific literature in toxicology generally concludes that there is a threshold below which non-carcinogens do not have a toxic effect, but that no such threshold for carcinogens appears to exist. For example, iodine in low doses, such as is present in table salt, is considered to be an essential nutrient, but at a higher dose, iodine is toxic. This distinction between the dose-response relationship of carcinogens versus non-carcinogens is considered so important in risk assessment, that two distinct methods of measuring their effects have been developed. For non-carcinogens, the amount of the compound is compared to a "reference dose", usually set at a level at which no adverse health effect will occur. For carcinogens, on the other hand, the risk is defined in terms of a probability of a cancer-induced death from exposure to a certain contaminant (e.g., one in a million). In standard risk assessments, these two types of effects are presented separately[35].

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[33] U.S. Department of Energy, Preliminary Summary Report, (September 1988) at 1-15.

[34] Industrial Economics Corporation (IEC), Analysis of Alternatives to the Superfund Hazard Ranking System Prepared for the EPA Office of Policy Analysis/Office of Policy Planning and Evaluation, Washington, D.C. (November 1988), at D-10.

In the MEPAS model, however, the effects of carcinogens and non-carcinogens are combined. This is accomplished by calculating a new index for non-carcinogens called a "Risk Factor" which is equal to the observed or predicted dose of a given non-carcinogen divided by the "Reference Dose" for that non-carcinogen. Then, the Risk Factor for each non-carcinogen is normalized to the probability scale for carcinogens by setting a Risk Factor of 1 equal to a cancer risk of one in a million. A report prepared for EPA was highly critical of DOE's novel methodology: "There is no scientific basis for equating a value of 1 for this risk factor with a cancer risk of [one in a million]; this is strictly a policy judgement."[36] This hidden policy judgement, contrasts sharply with DOE's own description of MEPAS as,[37] "an objective, scientifically-based computer ranking system."

4. MEPAS Fails to Consider Multiple Contaminants

Another serious problem with the MEPAS model is its failure to account for the additive effects of multiple contaminants at a site. The standard risk assessment methodology[38] is to add the effects[39] of all of the non-carcinogenic contaminants at a site. For example, the potential effects of iodine are added to effects of cadmium and ammonia. Instead of adopting this standard practice, MEPAS multiplies the Risk Factor (see Section B.3 above) by the exposed population (and an exponential weighting factor) to arrive at a preliminary hazard index (PI) for each contaminant. Then MEPAS takes the highest single contaminant PI as the basis for the Hazard Potential Index (HPI), which is the final score used for ranking. Hence, in a situation where there are twelve contaminants at a site (not an unusual situation) -- ten with PI scores of 50 and two with PI scores of 60 -- MEPAS would not add them to get a score of 28.3 but instead would select 17.8 as the HPI.[40] A report prepared for EPA criticized this methodology: "This approach may be problematic, since summing the PIs across substances would produce a better indicator of risk."[41] The net effect of this novel procedure is that sites with multiple contaminants are given lower scores than would be assigned using standard risk assessment practices.

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[35] See e.g., Scofield, R. et al., ENVIRON Corporation, "Multipathway Risk Assessment Methodology Compatible with California Decision Tree and U.S. EPA Guidelines," in Proceedings of the Fifth National Conference on Hazardous Waste and Hazardous Materials (April 1988), p. 368-372.

[36] IEC at D-10.

[37] DOE Preliminary Summary Report, September 1988, at 1-5

[38] See e.g., Environmental Protection Agency, Office of Emergency and Remedial Response, Public Health Evaluation Manual, EPA/540/1-86-060, OSWER Directive 9285.4-1, at p.69 (October 1986); and American Conference of Government Industrial Hygienists, Threshhold Limit Values and Biological Exposure Indices for 1987-1988, at p. 43, Cincinnati, OH; and EPA, "Guidelines for Health Risk Assessment of Chemical Mixtures", 51 Fed.Reg. 34021, September 24, 1986.

[39] Ideally, only the effects of contaminants with the same target organ system are summed, but in the absence of such information a systemic effect is generally assumed.

5. MEPAS Is Too Data Intensive

One of the most basic and intractable technical problems with the DOE's MEPAS model is the extraordinarily detailed level of data required for its operation. As a theoretical matter, a detailed risk assessment model such as MEPAS could provide useful information for determining the appropriate ranking of environmental problems. As a practical matter, however, the type of data needed for MEPAS far exceeds the amount of data generally available. Only after a detailed investigation of a site is completed is there sufficient data for MEPAS. However, to date, DOE has completed detailed site investigations at only a handful of the more than 3000 sites where wastes have leaked or spilled. And ironically, one of the purposes DOE stated for the rankings based on MEPAS is to determine which sites will receive funding for detailed investigations.

Because the data requirements of the MEPAS model far exceed the level of data generally available, a large number of assumptions have to be made for its operation. In making these assumptions, DOE has relied primarily on generalized, inaccurate and/or subjective sources of information. In fact, 104 out of 138 sites ranked in DOE's Preliminary Summary Report relied on a "moderate" or "significant amount of assumptions" for "critical data." Only 34 of the sites used monitored or measured data.[42] For example, the amount of waste buried in landfills for which no records were kept was often established by assuming recent disposal rates. But in many instances, historical rates of disposal were far higher than present rates. Furthermore, many of the numbers used in the model relied on no data whatsoever and were developed based only on the speculation of the Survey team members in sessions eerily called "Prioritization Decision Meetings". Additionally, in many situations generalized numbers known as "default" values, were incorporated into the model to be used whenever a site specific number was not available. The essential point is that the final prioritization ranking on which the September Preliminary Summary Report was based suggests an aura of objectivity that is simply not warranted by the process used to develop the scores.

In the Preliminary Summary Report, DOE suggested that the sampling and analysis program would help to fill these data gaps.[43] Yet in its own Survey Manual, DOE stated that "[t]he sampling and analysis is not intended to characterize a site's environmental problems."[44] Instead, it is only designed to "identify the presence of contaminants and the general zone of contamination associated with the environmental problems at the various sites ..."[45] This kind of information is simply inadequate to fill the needs of the MEPAS model.

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[40] To arrive at the HPI score, the PI scores are not simply added together. Instead, the HPI is a logarithm of the summed PI scores (see DOE/RL/87-09 at 9.7).

[41] IEC Report November 1988 at D-10

[42] DOE Preliminary Summary Report, at 2-17, 2-20, and 2-26.

[43] DOE Preliminary Summary Report at 1-24.

In contrast with MEPAS, one of the fundamental assumptions made in developing the HRS model for the Superfund program was the limitations on the amount and quality of data available for each of the sites being ranked. In fact, "Cost and Availability of Information" was the first section in EPA's response to comments section when it published the HRS in the Federal Register in 1982. EPA noted that, "the amount of information to be collected must be balanced against the cost and time required to obtain that information" (47 Fed. Reg. 31187). DOE, however, appears to have given no real consideration to this dilemma of seeking highly accurate results using a limited amount of data.[46]

6. MEPAS is Too Complex

MEPAS is an extremely complex model. It was developed on a large, sophisticated main-frame computer. It requires hundreds of potential inputs for each environmental problem. If an error occurs during input, it is extremely difficult to track down. Some calculations in MEPAS require so much computer time during implementation that they are left overnight to process.

In contrast, the HRS model used in the Superfund Program is much easier to apply than MEPAS. It can be used quite simply by filling out a series of forms with a hand-held calculator.[47] Of course, being complicated and sophisticated is not necessarily or undesirable, but in the case of a model intended to be operated on a minimal amount of input, and applied to a large number of sites, it is simply inappropriate.

The cost of implementing MEPAS provides another indication of its excessive complexity. The average cost of evaluating sites using MEPAS is over four times the cost of the HRS and almost twice as expensive as the proposed revised HRS.[48]

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[44] DOE, Office of Environmental Audit, The Environmental Survey Manual. DOE/EH-0053, Volume 1 of 4 (August 1987), at page 8-4.

[45] Id. (emphasis added).

[46] The documentation for MEPAS is actually only available for its base model, known as RAPS. This documentation also does not address this dilemma. See, Whelan, G. et al. Pacific Northwest Laboratories, The Remedial Action Priority System (RAPS): Mathematical Formulations, Prepared for DOE, DOE/RL/87-09; PNL-6200; UC-11, Richland, Washington (August 1987).

[47] U.S. EPA, Uncontrolled Hazardous Waste Site Ranking System A Users Manual, (1984) at HW-10.

[48] 53 Fed. Reg. 52002, December 23, 1988.

7. Priorities Set By MEPAS May Conflict with Legal Obligations

A fundamental question which DOE has not squarely addressed is how the priorities set by MEPAS will be reconciled with what may be very different priorities set by state and federal regulatory agencies and courts under RCRA and CERCLA. RCRA section 3004(u) gives EPA and certain states authority to set cleanup schedules at DOE facilities. CERCLA requires EPA to establish and update a National Priority List (NPL) of sites requiring cleanup. If, for example, EPA has placed a DOE site on the NPL as a high priority cleanup, but that site is low in the MEPAS-derived ranking, will DOE attempt to resist the EPA-ordered cleanup schedule? Also, some states have ranking systems of their own for sites that do not score high enough on the HRS to be listed on the NPL. These state rankings may conflict with the DOE priority scheme established using MEPAS. Another potential conflict may arise where a court has imposed a compliance or cleanup schedule under an environmental law such as RCRA or the Clean Water Act that addresses a problem that receives a low score in DOE's system.

8. DOE Has Not Clearly Acknowledged the Important Connection Between MEPAS and POS

DOE has failed to acknowledge clearly the essential nature of MEPAS in the POS program. One must dig very deeply into the POS report[40] to find even a brief mention of the output of MEPAS -the Hazard Potential Index (HPI) - to draw the connection between the two. And even though the MEPAS model results were published in September and released in December 1988, there is no mention of its connection to the POS system, which was released in August 1988. DOE's failure to acknowledge clearly the budget we have identified with the MEPAS model. budget we have identified with the MEPAS model.essential link between the two models is especially troubling in light of the serious flaws we have identified with MEPAS.

9. There are Serious Public Misconceptions about MEPAS

The Preliminary Summary Report developed using MEPAS was released to the public in December of last year. Although DOE was careful to stress that the rankings in the report were only preliminary, they have nonetheless taken on a more definitive cast thereby creating two misimpressions. The first misimpression is that the rankings indicate which sites will be cleaned up first and therefore how scarce cleanup funds should be allocated. Second, there is a misimpression that the priorities were based on an objective determination of risk. But as we have indicated, this is simply not the case.

10. MEPAS Has Never Been Subject to Formal Public Comment

DOE might have avoided many of the problems with MEPAS had it solicited public comment on the model as well as its results. Unfortunately, the same closed-door mentality that has characterized DOE's operations for years prevailed in the case of MEPAS. There was not a single opportunity for interested federal and state agencies, private organizations or citizens to comment on this multi-million dollar ranking model and its critical results.

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[40] DOE Report to the House Armed Services Committee (August 1988) at p. 6.

In contrast, EPA published the entire Hazard Ranking System in the Federal Register and solicited public comment.[50] EPA also routinely publishes for comment its proposed National Priority List sites, which are the product of HRS.

The Department of Defense also released for public comment its own priority-setting model called the Defense Priority Model (DPM).[51] EPA, as well as other agencies filed comments on DPM to which DOD is now responding.[52]

B. Environmental Data Needed For Cleanup Planning at DOE Facilities Is Unreliable

DOE's Environmental Survey program, which has produced over 30 detailed reports identifying environmental problems, has been a laudable effort to increase the Department's environmental data base. But we have significant concerns about the quality of the data developed in the program. Reliable data is vital to the design of an effective and efficient environmental cleanup program.

GAO has testified[53], and based on our experience we find, that DOE places more emphasis on quality assurance and quality control (QA/QC) in its weapons production operations than in its environmental monitoring. The Environmental Survey reports demonstrate that DOE facilities have greater expertise with analysis of radioactive than nonradioactive contaminants. The result of these emphases is that the accuracy of some of DOE's environmental monitoring for non-radioactive contaminants is suspect.

For example, at several DOE sites a common problem was the failure to follow the standard practice of chilling water samples to prevent the volatile organic contaminants from evaporating.[54] Without following this procedure, it is not clear whether the sample results indicate uncontaminated water, or improper handling that caused the contamination to evaporate before the sample could be analyzed. Similarly, GAO found problems with groundwater samples at the Savannah River Plant including mislabeled sampling sites and poor sampling methods.[55]

We are also concerned about the lack of proper QA/QC in laboratory procedures. For example, at several sites, samples that were intended to test the reliability of a laboratory's routine analytical procedures, were "flagged" for special attention. As a result, laboratory technicians knew that samples were intended for evaluating the lab's performance.[56] This special attention completely defeats the purpose of this QA/QC procedure.

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[50] 47 Fed. Reg. 10972 (July 16, 1982).

[51] 52 Fed. Reg. 44202 (November 18, 1987). It should be noted that unlike MEPAS the DOD's Defense Priority Model is used in conjunction with EPA's HRS model.

[52] See e.g., Letter from J. Winston Porter, EPA, to William H. Parker III, DOD, August 11, 1988.

[53] Peach, Dexter and Keith Fultz, General Accounting Office, Testimony Before the House Armed Services Committee, Subcommittee on Procurement and Military Nuclear Systems. February 24, 1989.

[54] See e.g., Preliminary Survey Report, Pantex Plant, DOE/EH/OEV-06-P, September 1987, p. 4-61; and Preliminary Survey Report, Portsmouth Uranium Enrichment Complex, DOE/EH/OEV-04-P, August 1987, p. 3-72.

[55] GAO, Dealing with Problems in the Nuclear Defense Complex Expected to Cost Over $100 Billion, GAO/RCED 88-197 BR.

C. Interim Remedies Should Be Used to Stabilize Some Sites

The lessons learned during the 1980s in the Superfund program should be applied to cleaning up DOE facilities. One important lesson was the usefulness of "interim remedies" i.e., remedies used to stabilize the spread of contamination and to reduce any short-term risks such as fire and explosion.

For example, the spread of contaminated groundwater can be halted or slowed by "counterpumping" strategically located wells. Also, "hotspots" of highly contaminated soil or sludge can be removed to eliminate the original source of the contamination thereby stemming its spread into the ground, air or waterways. The highly contaminated groundwater around the X-701B Holding Pond at the Portsmouth Uranium Enrichment Complex, for example, might be stabilized using hotspot removal and counterpumping.

In addition to direct environmental benefits, interim remedies are likely to save money in the long-term by ensuring that the contamination does not spread before a permanent remedy can be implemented. The use of interim remedies has been recommended by the Office of Technology Assessment[57] and by private contractors with significant experience in the Superfund program.[58]

Although interim remedies can provide quick, cost-effective responses, there are three important considerations concerning their use: (1) interim remedies should not be used as a substitute for permanent remedies; (2) distinct decision-making processes should be used for the interim and the permanent remedies so that interested citizens will have an opportunity to comments on both phases;[59] (3) the implementation of an interim remedy should not interfere with any planned long-term remedy. For example, soil covers should be avoided in cases where subsequent exhumation of wastes might be necessary because excavation through this type of cover is more difficult and expensive. Such an interim remedy should also be avoided because it might serve as a disincentive for implementing the final cleanup.

D. Interagency Agreements - Impact on DOE Compliance and Cleanup

At a number of facilities, EPA and DOE, sometimes in conjunction with an affected state, are entering into interagency agreements pursuant to the Superfund Amendments and Reauthorization Act (SARA), Section 120(e)(2), and other authorities. SARA Section 120(e) states that DOE shall enter into these agreements for sites listed on the Superfund National Priorities List following preparation of a "Remedial Investigation and Feasibility Study."

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[56] DOE, Environmental Survey Preliminary Report Los Alamos National Laboratory, DOE/EH/OEV-12-P at 4-118 (January 1988); DOE, Environmental Survey Preliminary Report, Kansas City Plant, DOE/EH/OEV-11-P at 4-65 (January 1988).

[57] Office of Technology Assessment (U.S. Congress) Superfund Strategies. April 1985, p. 39.

[58] See e.g., testimony of William A. Wallace, CH2M Hill, and Gary A. Dunbar, CDM, before the Subcommittee on Commerce, Tourism, and Transportation, 1983, Ser. No. 98-128.

[59] Environmental Defense Fund, et al. Right Train, Wrong Track: Failed Leadership in the Superfund Cleanup Program. June 20, 1988.

We are undertaking a review of the interagency agreement process, with specific focus on the agreements being negotiated at Hanford and Savannah River. We expect to have preliminary results of this review by the end of this month. However, there are some general concerns we can articulate now:

(1) The interagency agreement process is increasingly being used to override RCRA and thereby sanction the continued violation of this critical environmental law. SARA Section 120(i) is explicit that nothing in the interagency agreement process "shall affect or impair the obligation" of DOE to comply with RCRA. Yet in interagency agreements like the one being worked out at Hanford, DOE is explicitly allowed to continue certain waste disposal and management practices which are specifically prohibited under RCRA and which would elicit swift federal or state enforcement actions in the case of a private facility.

(2) In the interagency agreement process DOE is making multi-year commitments for cleanup funding and for the payment of state oversight costs that it may not be able to keep. States are being lured into signing interagency agreements on the basis of these promises. But DOE's commitments have neither OMB's blessings nor Congressional approval.

(3) The interagency agreements are impairing the rights of EPA, states and citizens to enforce RCRA and CERCLA at federal facilities. Among other things, enforcement efforts may be hampered by an elaborate and cumbersome dispute resolution process.

(4) The interagency agreements are sanctioning foot-dragging by DOE in carrying out critical cleanup activities. For example, under the draft Hanford agreement, DOE will not even characterize -- to say nothing of clean up -- the high-level wastes in leaking single-walled tanks at Hanford until around the turn of the century.

(5) The interagency agreements are generally not addressing decontamination and decommissioning of contaminated buildings and structures, but rather only waste sites. CERCLA/SARA clearly cover the cleanup of buildings and structures contaminated with non-radioactive and radioactive hazardous substances. At Hanford alone, DOE has identified 220 buildings and structures no longer in use. Overall, DOE estimates that $3 to $4 billion will be needed for decontamination and decommissioning. However, DOE's program does not account for many buildings that will be shut down in the near future. GAO's estimate for decontamination and decommissioning, which includes funds for facilities currently in use, is more than $15 billion.

E. Congress' Response

Congress should take a number of steps to address the problems with DOE's management of its environmental problems.

1. Congress should instruct DOE to halt use of the MEPAS prioritization model.

DOE's MEPAS model, as we have shown, is seriously flawed.

As a result, MEPAS should not be used for establishing cleanup priorities, including the revised rankings DOE is expected to release this year in the Environmental Survey Summary Report. MEPAS should also not be used as an input to POS for setting budget priorities.

Establishing waste site cleanup priorities is an appropriate function for a regulatory agency like EPA, not DOE. Other environmental problems at DOE facilities should be addressed through existing EPA and state regulatory structures. Because DOE's current budget request is primarily for investigation rather than cleanups, the problems with MEPAS should not significantly affect the FY90 budget process for environmental restoration activities.

2. Congress should insure that DOE develops more reliable environmental data

Congress should sponsor an independent review of the adequacy of DOE's environmental monitoring capabilities, including the Department's quality assurance/quality control programs.

3. Congress should direct DOE to use interim cleanup remedies to stabilize sites where appropriate.

Interim remedies such as "counterpumping" and "hot spot" removal offer significant environmental and economic benefits in some cases. Congress should ensure that these remedies are used whenever possible but that they not substitute for long-term permanent remedies.

4. Congress should reconsider the interagency agreement process.

Given the problems with the interagency agreement process, Congress should revisit the process it created in CERCLA/SARA.

5. Congress should support legislation to improve DOE environmental management and compliance.

In light of DOE's environmental management problems, we strongly urge Congress to adopt a bill (H.R. 765) recently introduced by Rep. John Dingell (D-MI), and over 25 Democrat and Republican cosponsors, that would establish a temporary commission to make recommendations to the President and Congress regarding approaches to effective and efficient cleanups. We also urge Congress to enact H.R. 1056 introduced by Rep. Dennis Eckert (D-OH) that would increase the authority of EPA, states and citizen groups to enforce DOE compliance with RCRA.

Senator **Exon**. Thank you, Mr. Reicher.

Do you have a statement, Mr. Werner?

Mr. **Werner**. No. I would be happy to answer any questions, however.

Senator **Exon**. Let me start out by following up on what you just said. We have not produced any enriched uranium in this country for 20 years, have we?

Mr. **Reicher**. That is right. As I understand it, in 1964 President Johnson made the decision to halt the production of highly enriched uranium. We have not made any in this country since then. Our view is that we have reached the same point with respect to plutonium. We have been building up our supply since the late 1940s actually, and it is time that we do the same for plutonium that we did for highly enriched uranium in 1964.

Senator **Exon**. What about tritium?

Mr. **Reicher**. Tritium, given the fact that it does decay, will have to be produced if we are to maintain the current nuclear arsenal in its present state. The question is how much we actually have to produce. Do we need two reactors worth of tritium? The answer to that seems to be no, given that one reactor alone according to DOE will produce 100 percent of needs and that the second reactor would produce an additional 50 percent on top of that first 100 percent.

So what we have to focus on with respect to tritium is how much capacity we actually need. Our view is that we do not need the second new production reactor.

Senator **Exon**. Does the Soviet Union continue to produce tritium?

Mr. **Reicher**. I do not know the answer to that, Senator.

Senator **Exon**. I believe they are. Would you get the answer for us?

I think we have to be guarded against unilateral disarmament here. I want to make it very clear that I think there still is a potential threat here, it is pretty clear to me that this country has a critical situation on its hands right now with regard to tritium, and I think we should keep emphasizing that.

Mr. **Reicher**. We are not calling for unilateral cuts in these materials. We believe that the two countries can reach agreements bilaterally, and the place to start is with highly enriched uranium and plutonium.

Senator **Exon**. Would you think it would be fair to say that since we have not produced this for over 20 years, the Soviet Union is finally catching up? I do not think it is very significant that they have come out with perestroika or glasnost and they are not going to produce uranium anymore. They finally came around to doing something that we did a long time ago.

Mr. **Reicher**. In the case of highly enriched uranium, that is correct. In the case of plutonium I would differ because they, in fact appear as a result of today's announcement to be cutting back and phasing out plutonium production reactors in that country, and that is the same sort of thing that we believe we need to be doing in this country.

Senator **Exon**. They have not offered to stop plutonium production, though, have they, the Soviets?

Mr. REICHER. As I understand it, they are talking about the shutdown last year of an industrial reactor for the production of weapons grade plutonium, and they are planning to shut down two other such reactors this year and next year without commissioning new units to replace them.

Senator EXON. Of course, that does not say what it leaves them, does it?

Mr. REICHER. That is true. I do not think that I said, Mr. Chairman, that they were halting all plutonium production. What I said was that they were phasing out plutonium production reactors. I certainly do not know what that leaves in terms of their production capability, but from the statement it appears that they are moving in a direction of reducing their plutonium production, and that is the direction that we ought to be headed in this country as well.

Senator EXON. Let me start out the questioning in this way. Mr. Reicher and Mr. Werner, you recommend that the Congress direct DOE to clarify its budget so that the funding for cleanup activities is more easily identified, and that seemed like a good suggestion to me.

As you probably know, DOE's environmental restoration program has two parts: remedial action at inactive waste sites; and decontamination and decommissioning of old DOE nuclear facilities that must be dismantled.

The 2010 study states that the environmental cleanup at DND each has its unique set of challenges and corresponding strategy. This suggests that it may make more sense to treat remedial actions and decontamination and decommissioning as separate line items?

Do you agree, or do you not agree? Do you have any specific suggestions for clarifying DOE's budget request that we are wrestling with both here and at the Budget Committee at this time?

Mr. WERNER. I think it is a very good place to start and, in fact, that is an excellent example because environmental restoration is generally regulated by EPA and State agencies, whereas the decontamination and decommissioning is regulated by NRC. We have a completely separate set of technical circumstances, a completely separate set of institutional actors involved. There are a lot of other areas where we can distinguish between different cleanup needs, too.

Mr. REICHER. One of those areas, Mr. Chairman, is in a category called corrective action. It includes upgrading existing facilities to bring them into compliance with environmental standards, and DOE does not break that budget category out very clearly and needs to improve its budget in that regard.

I would just make one correction of the statement Mr. Werner made. With respect to decontamination and decommissioning, there is actually no NRC oversight in the weapons complex, and therefore DOE self-regulates in that program.

Senator EXON. You both indicated, it seems to me, quite clearly that in your opinion the proposed DOE budget falls far short and does not provide adequate funding for the environmental cleanup.

How much more additional funding do you believe from what you know now DOE can productively and efficiently use in fiscal year 1990, and to what specific projects, if any, could you identify that you would allocate those funds if you had that option?

Do I understand correctly that you believe some additional funding could be used for interim cleanup actions specifically in 1990 and that any laboratories needed to do should be more involved in developing the cleanup technologies? Be as specific as you can.

Mr. REICHER. Mr. Chairman, we are developing right now a report that will look more specifically at specific cleanup recommendations and increases in funding. I can say now that we would believe that more than the $50 to $100 million the GAO spoke about this morning is required. How much more, we are not prepared to say at this time.

We do believe that there has to be increased spending on interim cleanups and interim remedies that you mentioned. Those are the sorts of things that can be done right away and that can reduce the spread of contamination and thereby reduce cleanup costs.

With respect to laboratory capacity as well, that certainly needs to be beefed up at a number of facilities in order to get on with cleanup.

Senator EXON. Thank you. My time is up. There may be additional questions for the record that we will ask you to answer.

Several other Senators have questions. I will be glad to recognize Senator Thurmond at this time.

Senator Thurmond.

Senator THURMOND. Thank you very much, Mr. Chairman.

Mr. Chairman, first I would ask unanimous consent that my opening statement follow that of the distinguished chairman of the subcommittee. I had to be with the commanders in another appointment this morning, two different appointments, and could not be here for the hearing. I will have some questions to be answered for the record and ask unanimous consent that they be answered for the record by the GAO.

Senator EXON. It will be so included.

Senator THURMOND. Mr. Reicher and Mr. Werner, during a series of hearings including the testimony of the GAO today, there has been a broad consensus as fiscal year 1990 funding levels for cleanup are adequate. This is largely due to the need for a rational planning process for cleanup activities before a significant infusion of funding.

You said that funding is not adequate, at the same time discrediting one of the planning tools used to identify needs.

On what basis do you say they are unfunded requirements that can be addressed now? Either one of you may reply.

Mr. WERNER. We mentioned that we will be providing a more specific report, but I have been out to a lot of these facilities. I have seen what is going on out there. I have seen the needs, and I have talked to the people. I can tell you there are a lot of fine, very talented people in DOE and working as contractors who in a sense need to be unleashed to apply their talents in performing environmental cleanup.

In terms of the specific funding needs for fiscal year 1990, there are a lot of interim remedies such as counterpumping as Mr. Reicher mentioned that have been found to be useful to take quick action to stabilize or halt the spread of contamination. These are remedies that need to be applied on a broad level.

In terms of the planning tool that you mentioned, I presume you are referring to the MEPAS model; is that correct, Senator?

We did present testimony previously stating several concerns about DOE's model for prioritizing environmental problems at its facilities. In summary, the main problem we found was the model was just the wrong tool for the job. It is extremely complex and data intensive, and required much more data than is generally available. In addition, there are other tools that are available that can be used for this job.

The primary point was not that the model is poorly designed. Although we did find some technical problems with the model, it is just the wrong model for the job. We are recommending that this model just simply be dropped and that the Department use available tools and abide by current regulations.

Senator THURMOND. Either one of you can answer this question. You take issue with the special isotope separation portion of the modernization plan. Of the aspects of the plan that you do support such as a new production reactor, if you do not support the NPR, what do you now support, and why do you not support it if you do not support it?

Mr. REICHER. There are aspects of the modernization plan that we do support. We do believe that if we are going to maintain the arsenal in its present size that we have to produce tritium. We take issue, though, with the decision to build two reactors. We do not believe the second reactor is necessary.

We also take issue with the decision to authorize and appropriate construction funds for the new production reactors in fiscal year 1990. Our view is that if there is funding for the new production reactor it should only be for research and development in fiscal year 1990.

Senator THURMOND. As I understand then, you do support the new production reactor?

Mr. REICHER. If there is a clear need for tritium identified to maintain the arsenal, then it would stand to reason that we do need a safer, more reliable source of this material and that we have to give serious consideration to a new production reactor. But, I would mention that there are other alternatives that have to be addressed. Until those alternatives are addressed in an environmental impact statement, we cannot lend our support to a new production reactor. We believe it would be inappropriate to lend our support to a decision to construct a new production reactor.

One of those alternatives that is being explored is a so-called linear accelerator, another way to produce tritium. The environmental impact statement will not be completed for another couple of years, and until that time we cannot make a full commitment to any particular technology.

Senator THURMOND. Either one can answer this. Is it your view that the Department of Energy would have arrived at a different set of cleanup priorities had it used the ranking models of the Environmental Protection Agency of the Department of Defense?

Mr. WERNER. It is hard to say what the priorities would be since those models have not been run on DOE sites. But, there was a study related to this question sponsored by EPA. They looked at the three models and compared the results on a limited number of sites. They looked at 20 hazardous waste sites from the Superfund program. The results from the three models were extremely divergent.

In the Federal Register notice, EPA concluded based on that study and several other studies that the best model to use was the Hazard Ranking System.

Senator **THURMOND**. Mr. Chairman, I think that is all the questions I have at this time.

Senator **KENNEDY** [presiding]. First of all, I want to commend you on an excellent presentation. I think it has really sharpened up the picture in terms of the priorities and in identifying the areas of need in a very detailed way. I think it has been of real service.

With regard to the proposals of the Soviet Union, we do not know, or at least I am under no impression that there has been any effort to try to reach an agreement with the Soviet Union in terms of the production of these materials.

It seems to me that the significance of the statement would be to hopefully encourage the administration to find out whether we can reach such an agreement. There is legislation, which I am proposing, to urge that with adequate verification. So bringing that to the attention of the committee is useful, I think.

I have to go over to the floor, but would you be willing to comment in detail for the record on the specific savings that you think could be effected on the production side over the next 5 years in order to provide more resources for the cleanup effort? Would you provide that for the record? I think it would be helpful.

Mr. **REICHER**. Yes, we will, Senator.

[The information follows:]

PROPOSED SAVINGS FROM REDUCTIONS IN DOE WEAPONS PROGRAMS

The following reductions in unnecessary or low priority nuclear weapons projects should be made in FY 1990. These proposed cuts are a necessary first step towards downsizing DOE's nuclear weapons production complex in light of serious budgetary constraints, reduced requirements for plutonium production, anticipated strategic nuclear arms reduction agreements, such as the START Treaty, and critical cleanup needs.

A. ALTERNATIVE BUDGET PROPOSALS

Both of the alternative budget scenarios presented here propose cuts in the three major DOE nuclear weapons production budgets—nuclear materials production, the new production reactor program, and nuclear weapons activities.

Both budget scenarios make an additional $1 billion available for cleanup. Both scenarios also add $30 million to verification activities that will be increasingly necessary as the United States and the Soviet Union negotiate arms control agreements. Neither of these budget scenarios calls for any increase in the total Department of Energy budget above the level requested by President Bush.

Budget Scenario I, emphasizing across the board cuts in DOE's weapons production budgets in FY 1990, would: Eliminate Special Isotope Separation plant construction funds; eliminate plutonium separation and processing at Hanford and the Savannah River Plant; postpone the restart of the Savannah River reactors at least until the second half of FY 1990; eliminate Fernald modernization funding; eliminate operation of and new construction funds for the Idaho Fuels Processing Facility; cut New Production Reactor R&D funding from $203 million to $120 million, and eliminate NPR construction funds; and make across-the-board cuts in nuclear weapons research, development, testing and production, including Nuclear Directed Energy Weapons.

Budget Scenario II emphasizes cuts in FY 1990 budgets for unnecessary or low priority activities programs that have contributed most to the current cleanup problem, and for the first time bills the Department of Defense for some of the costs of cleanup at DOE's nuclear weapons production facilities. Scenario II would: Include the same cuts in nuclear materials production, except for allowing continued operation of the Idaho Fuels Processing Facility; include the same cuts in the New Production Reactor program; restore funding for nuclear weapons research, development and testing, including Nuclear Directed Energy Weapons, but retain the budget cuts in the nuclear weapons production program; and include a $295 million contribution from Department of Defense program cuts, to bring cleanup and environmental restoration funding up to $1 billion in FY 1990.

ALTERNATIVE FUNDING LEVELS FOR MAJOR DOE WEAPONS PROGRAMS FISCAL YEAR 1990

[In millions of dollars]

	President Bush's budget request	Recommended funding	
		Scenario I	Scenario II
A. Nuclear materials production:			
1. Special isotope separation plant:			
a. R&D at Livermore	$79	$79	$79
b. Construction in Idaho	115	0	0
2. Plutonium separation and processing at Hanford	164	0	0
3. Plutonium separation at SRP:			
a. Separation	[1] (?)	0	0
b. Construction	10	0	0
4. Savannah River reactor operation	199	[2] 150	[2] 150
5. Modernization at Fernald	19	0	0
6. Idaho fuels processing facility:			
a. Processing operations	78	0	78
b. Construction	55	0	0
7. Remaining projects	1,495	1,495	1,495
Subtotal	2,214	1,724	1,802
B. New production reactors:			
1. R&D	203	120	120
2. Construction	100	0	0
Subtotal	303	120	120
C. Weapons activities:			
1. Weapons R&D and testing:			
a. Nuclear directed energy weapons:			
(1) Program activity	145	75	145
(2) Testing	121	60	121
b. Weapons R&D (minus NDEW)	1,239	1,177	1,239
c. Weapons testing (minus NDEW)	479	455	479
2. Weapons production	2,554	2,416	2,416
3. Program direction	100	100	100
Subtotal	4,638	4,283	4,500
D. Defense waste and environmental restoration:			
1. Defense waste	900	1,300	1,300
2. Environmental restoration	401	1,000	1,000
Subtotal	1,301	2,300	2,300
E. Verification and control technology	149	179	179
F. Other atomic defense activities	781	781	781
Total DOE atomic defense	9,387	9,387	9,682
G. Contribution from DOD	0	0	(295)
Total	9,387	9,387	9,387

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[1] The funding for plutonium separation at the Savannah River plant is not listed separately from processing operations at this site in the fiscal year 1990 budget request.

[2] We recommend not restarting the Savannah River reactors until at least half way through fiscal year 1990. We estimate that this would save over $50,000,000 in operating costs in fiscal year 1990.

Senator **Kennedy**. In addition, please provide what you think the Congress should be doing to assure that the cleanup effort is completed within a reasonable timeframe. You referenced that earlier in terms of a balanced allocation of resources, but if there is something with greater specificity, perhaps you might be willing to help us on that with whatever ideas you might have.

[The information follows:]

Environmental Cleanup Must Be Made a Higher Priority within DOE

Summary

The DOE must substantially increase its commitment to cleanup of the toxic and radioactive legacy of four decades of U.S. nuclear weapons production. The current DOE plan calls for a cleanup that stretches for more than 40 years. In contrast, the Department intends to fully modernize the nuclear weapons production complex in 20 years. DOE's half-hearted commitment to environmental restoration will allow contamination to spread, driving cleanup costs still higher. The Department's skewed priorities are well illustrated by its recent request to reprogram millions of dollars from environmental activities to weapons production. DOE's priorities must be changed.

Congress should set DOE on a path toward cleanup of the weapons complex that is at least as swift as modernization. The first step is to increase substantially the commitment to environmental restoration in the FY90 budget. Specifically, Congress should increase funding in FY90 for:

- interim remedies to halt or slow the spread of contamination,
- environmental monitoring, especially the establishment of new monitoring wells,
- research and development on waste management techniques,
- laboratory capacity to ensure adequate analytical capability for cleanup,
- decontamination and decommissioning to reduce contamination, and
- accelerated design and construction of defense waste processing facilities.

These measures will increase significantly the progress we can make on DOE cleanup in FY90, and will also add to the technical foundation for cleanup in future years. They can be undertaken with an additional $300 million for environmental restoration (as recently recommended by the House Budget Committee), and an additional $100 million for defense waste management in DOE's FY90 budget.

Additionally, Congress should disapprove the Department of Energy's recent requests to reprogram funds from environmental projects to weapons production activities. Finally, this panel should act favorably on H.R. 765, recently reported out of the Energy and Commerce Committee. The bill would establish a special temporary commission to review and make recommendations about the cleanup of DOE facilities.

A. DOE Needs to Accelerate Cleanup to Meet Long-term Needs

Over the past year the DOE and the General Accounting Office (GAO) have released reports[1] [2] [3] [4] estimating that environmental cleanup and compliance activities at DOE's nuclear weapons production complex could cost in excess of $100 billion.[5] A DOE report released in July 1988, estimates that the bill for cleanup and compliance could be $66 to $110 billion.[6] The General Accounting Office (GAO) estimates that DOE cleanup and compliance costs could be higher still: $100 to $130 billion, or $1.7 to $2.2 million for every nuclear warhead the United States has produced.[7] Subsequent DOE reports contain similar estimates, making it clear that environmental cleanup and compliance at DOE's nuclear weapons production complex is one of the most expensive environmental projects facing the nation.

DOE's most comprehensive estimate of the cost for the entire cleanup and compliance job at the weapons complex is contained in the December 1988 Needs Report. This report estimates that the total bill for cleanup and compliance will be $48 to $86 billion, plus an additional $1.4 billion annually to cover the "base" environmental program. The DOE and GAO cost estimates are summarized in Table 1.[8]

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[1] Department of Energy, "Environment, Safety, and Health Needs of the U.S. Department of Energy, Volume 1: Assessment of Needs" (DOE/EH-0079), December 1988.

[2] Department of Energy, "United States Department of Energy Nuclear Weapons Complex Modernization Report: Report to Congress by the President," December 1988 (commonly referred to as the "2010 Report").

[3] Department of Energy, "Environment, Safety and Health Report for the Department of Energy Defense Complex," July 1, 1988.

[4] General Accounting Office, "Dealing with Problems in the Nuclear Defense Complex Expected to Cost Over $100 Billion," (GAO/RCED-88-197BR), July 1988.

[5] All figures are in FY90 dollars unless otherwise indicated.

[6] Supra note 3, at 35. The $66 to $110 billion includes $26 to $40 billion for environmental base program activities.

[7] GAO/RCED-88-197BR, July 1988, at 6. The U.S. produced approximately 60,000 nuclear warheads between 1945 and 1986 (Cochran, T.B. et al. U.S. Nuclear Warhead Production Volume II, Ballinger Publishing Company, Cambridge, MA, 1987, at 5).

[8] The components and magnitude of these cost estimates are explained in the NRDC report, "One Hundred Billion Dollars and Counting: A Primer on the Costs of Cleaning Up the DOE Nuclear Weapons Production Complex", by Dan W. Reicher and Jason Salzman, Natural Resources Defense Council, March 1989.

Table 1

DEPARTMENT OF ENERGY CLEANUP AND COMPLIANCE COSTS*

Cleanup or Compliance Activity	Estimated Cost	
	DOE	GAO
Corrective Action	6-14	20
Remedial Action	35-63	35-65
Radioactive Waste Management	4-5	30
Decontamination/ Decommissioning	3-4	15
TOTAL	48-86	100-130
Base Program (annual cost)	1.4	__**

* In billions of FY90 dollars

** GAO does not include base program funds in its estimate because it considers them a "normal cost of doing business that would be necessary whether DOE had any problems or not."[9]

Whatever the exact costs for cleanup and compliance, it is clear that current DOE funding plans for these activities are inadequate. The Bush Administration's Fiscal Year (FY) 1990 budget request for DOE's nuclear weapons production activities is about $9.4 billion. Of this, just $372 million, or some 4 percent, is earmarked for actual remedial action at DOE's 3,000 waste sites. While this is an $81 million increase over the Reagan Administration's request and a $230 million increase over the current level of funding, it falls far short of what is needed. Assuming DOE's $65 billion estimate for remedial action and the proposed $372 million funding level, it would take about 175 years--or until the year 2165--to complete remedial action.

DOE's response to its decontamination and decommissioning needs is also totally inadequate. Just $29 million is allocated to these activities in DOE's proposed FY90 budget. At this spending level, decontamination and decommissioning projects will take over 135 years--or until the year 2125--assuming the Department's $4 billion estimate for this work. And it should be noted that the Department does not include in its estimate the cost of decontaminating and decommissioning buildings currently in use. GAO does include these costs and its estimate for decontamination and decommissioning is $15 billion. As Raymond Berube, DOE Deputy Assistant Secretary for Environment admitted at a recent Senate Armed Services Committee hearing, "Clearly our needs exceed what's in the Fiscal 1990 budget request."

Over the long run, DOE's plans for meeting projected cleanup needs are equally inadequate. Under the spending scheme outlined in the "2010 Report", the weapons complex would be fully modernized over 20 years at a cost of $52 billion above current funding levels. By contrast, the "2010 Report" provides only a $29 billion increase above current funding levels for remedial action and decontamination and decommissioning. And this increase would pay for less than half of the cleanup funding that DOE projects it will need.[10] Thus the "2010 Report" makes clear that cleanup activities will continue to take a backseat to weapons production over the next two decades.

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[9] GAO/RCED-88-197BR, July 1988.

As part of its "2010 Report" the Energy Department proposed a two-phased cleanup program.[11] Figure 1 illustrates the DOE approach, referred to here as the "Proposed DOE Program".[12] Under this approach, environmental restoration spending would increase steadily (at $60 million/year) to approximately $700 million annually in FY95 (see specific annual funding listed in Table 2). Until 1995, only high priority remedial actions would occur, while studies were performed on the other sites. Between 1995 and 2000 DOE proposes to increase spending on environmental restoration at a faster rate ($260 million/year) until a steady state level of $2 billion per year is achieved in FY 2000. This spending rate would remain constant until the program is finished. The spending rate would decline between 2028 and 2033 at the same rate that it increased between 1995 and 2000 until an operation and maintenance level of $200 million/year is reached in 2033.[13]

DOE's proposed program has troubling implications. If DOE's approach were to be followed, only twelve percent ($8.8 billion) of the needed cleanup would be finished by the year 2000. In addition, the cleanup would stretch out for over 40 years -- until after the year 2030. This half-hearted approach would not only leave most of the cleanup yet to be accomplished after 20 years, it would also result in an escalation of the total cleanup cost as contamination spreads while action is delayed and the cleanup job gets bigger.

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[10] Assuming the total bill for remedial action and decontamination at the complex is $65 billion, as estimated in the December "Needs" report and DOE spends $32 billion on these activities over the next two decades ($29 billion plus $3 billion cumulative current funding), as outlined in the "2010 Report", more than half the cleanup job would still remain in the year 2010. Based on GAO's estimate of $80 billion, cleanup would be only slightly more than one-third complete by this date.

[11] DOE, Supporting Documentation to the President's Report on Nuclear Weapons Complex Modernization: Waste Management, Environmental Restoration and Operations Environment, Safety, and Health, December 1988, at 31.

[12] The specific annual expenditures are listed as the "DOE Program" in Table 1. These annual expenditures are derived from the benchmarks established for 1995 ($700 million/year) and for 2000 and after ($2 billion/year) as well as the total estimated cost of environmental restoration ($70 billion) given in the "2010 Report".

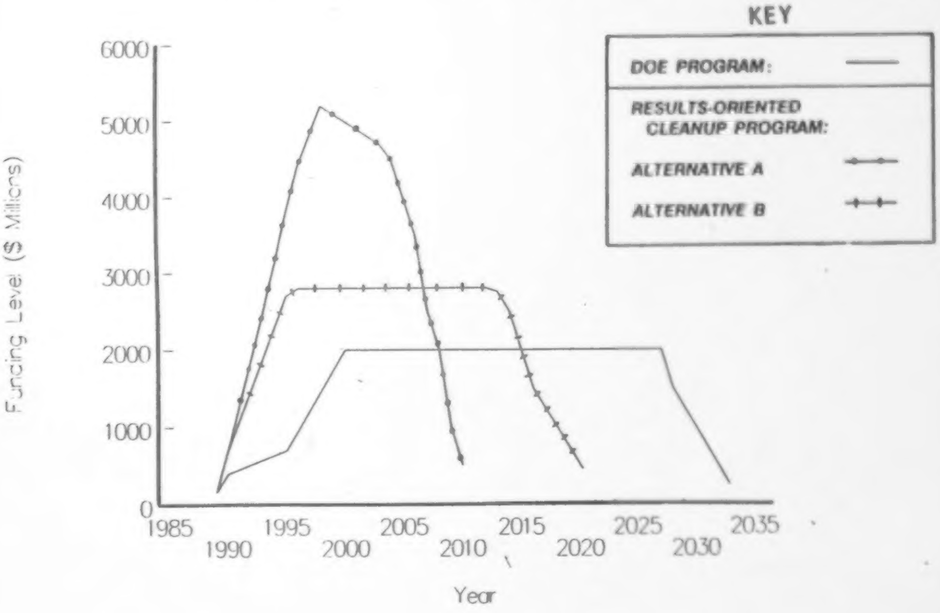
[13] A mathematical error seems to have occurred in DOE's "2010 report" in summing the spending between 1990 and 2010. If the total annual environmental restoration spending between 1990 and 2010 is calculated, based on the benchmarks given in the Supporting Documentation of the "2010 report", then approximately $31 billion would be spent. However, the executive summary (page v) of the "2010 report" indicates that only $28.8 billion will be committed to environmental restoration.

The cleanup plan outlined in the "2010 Report" is inadequate. We believe that cleanup should occur at least as fast as modernization, which DOE projects will take 20 years to complete. Under a 20-year timetable, cleanup funding would increase steadily until 1998, when a funding level of approximately $5 billion is reached (see Figure 1). The cleanup program would then scale down so that most of the cleanup is completed, and only operation and maintenance costs for treatment systems would be incurred after the year 2010.[14] This cleanup strategy is listed as "Result-oriented Cleanup Program/Alternative A" in Table 2, and illustrated in Figure 1 as the upper curve.

FIGURE 1

Department of Energy

Environmental Restoration Funding



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[14] The final annual operation and maintenance level for the "DOE Program" ($200 million) is assumed to be less than that for the "Results-oriented Program" alternatives ($500 million) because of the different program lengths assumed for performing the remedial construction activities. The 40-year DOE Program would include enough time to complete the operation and maintenance for many of the projects begun during the early part of the program, whereas, for a shorter program, much of the operation and maintenance will still be ongoing when remedial construction is completed.

TABLE 2

DEPARTMENT OF ENERGY ENVIRONMENTAL RESTORATION FUNDING

PROPOSED DOE PROGRAM	RESULTS-ORIENTED CLEANUP PROGRAM	
"2010" Report Assumptions:	Alternative Assumption:	
Delay 88% of Cleanup to After 2000	Control Spread of Contamination Early	
Spend $2 Billion/Yr. After 2000	Finish $70 Billion Cleanup in:	
Finish $70 Billion Cleanup 2033	20-Year Period	30-Year Period

Fiscal Year	DOE Program Assumptions Amount ($Millions)	Alternative Program A Amount ($Millions)	Alternative Program B Amount ($Millions)
1989	159	159	159
1990	400	700	700
1991	460	1300	1100
1992	520	1900	1500
1993	580	2500	1900
1994	640	3100	2300
1995	700	3800	2700
1996	960	4400	2800
1997	1220	4800	2800
1998	1480	5200	2800
1999	1740	5100	2800
2000	2000 Subtot. =	5000	2800
2001	2000 $8.86 Bill.	4900	2800
2002	2000	4800	2800
2003	2000	4700	2800
2004	2000	4500	2800
2005	2000	4000	2800
2006	2000	3500	2800
2007	2000	2500	2800
2008	2000	2000	2800
2009	2000	1000	2800
2010	2000	500	2800
2011	2000 Subtot. =	Total = $70 Bill.	2800
2012	2000 $31 Bill.		2800
2013	2000		2750
2014	2000		2500
2015	2000		2000
2016	2000		1500
2017	2000		1250
2018	2000		1000
2019	2000		750
2020	2000		500
2021	2000		Total = $70 Billion
2022	2000		
2023	2000		
2024	2000		
2025	2000		
2026	2000		
2027	2000		
2028	1500		
2029	1240		
2030	980		
2031	720		
2032	460		
2033	200		
	Total = $70 Billion		

We also considered an alternative cleanup program over a 30-year period ending in the year 2020. Under this timetable, the level of activity would grow steadily until the year 1996 when annual spending of $2.8 billion would be reached. This cleanup rate would continue until 2012 when the cleanup program would scale down, and finish in 2020 except for a maintenance level of $500 million. In Table 2, this approach is listed as "Results-oriented Cleanup Program/Alternative B" and illustrated in Figure 1 as the middle curve. As shown in Figure 1, even this stretched-out cleanup program will require a significantly greater level of effort in FY90 than envisioned by DOE.

Comparing DOE's environmental cleanup needs with those of the Department of Defense further illustrates the inadequacy of DOE's plans. Figure 2 shows the Defense Department's plans to expand its cleanup program rapidly over the next several years. DOD's cleanup spending is expected to peak at nearly a billion dollars per year in 1994 and then decline again until it levels off in 2005. Although we are concerned that the cleanup of Defense Department sites is not being funded at planned levels, and that it underestimates the total cleanup costs, it is nonetheless useful as a benchmark in considering DOE's plans.[15]

Admittedly, DOE's total cleanup task is almost five times larger than the Defense Department's.[16] However, the DOE cleanup will occur simultaneously at hundreds of separate sites. Therefore, if substantial additional resources were devoted to the cleanup, the task could be accomplished in a timeframe similar to that projected by DOD.

B. Congress' Response

DOE has repeatedly demonstrated its inability to manage its environmental problems. Over the years, DOE environmental programs have taken a back seat to its weapons mission. DOE's insistence on asking for immediate funding for low priority weapons projects, combined with the Department's recent request to reprogram funds from environmental restoration to weapons production demonstrates that DOE's priorities have not changed. Congress must take charge.

In developing a comprehensive legislative approach to environmental problems at the weapons complex, Congress must make the following assumptions. First, DOE cleanup and compliance costs will, over the next several decades, constitute a major new element in DOE's budget requiring substantial funding. Second, as explained above, the cost of cleanup will rise over time, especially if stabilization and remedial work is not begun

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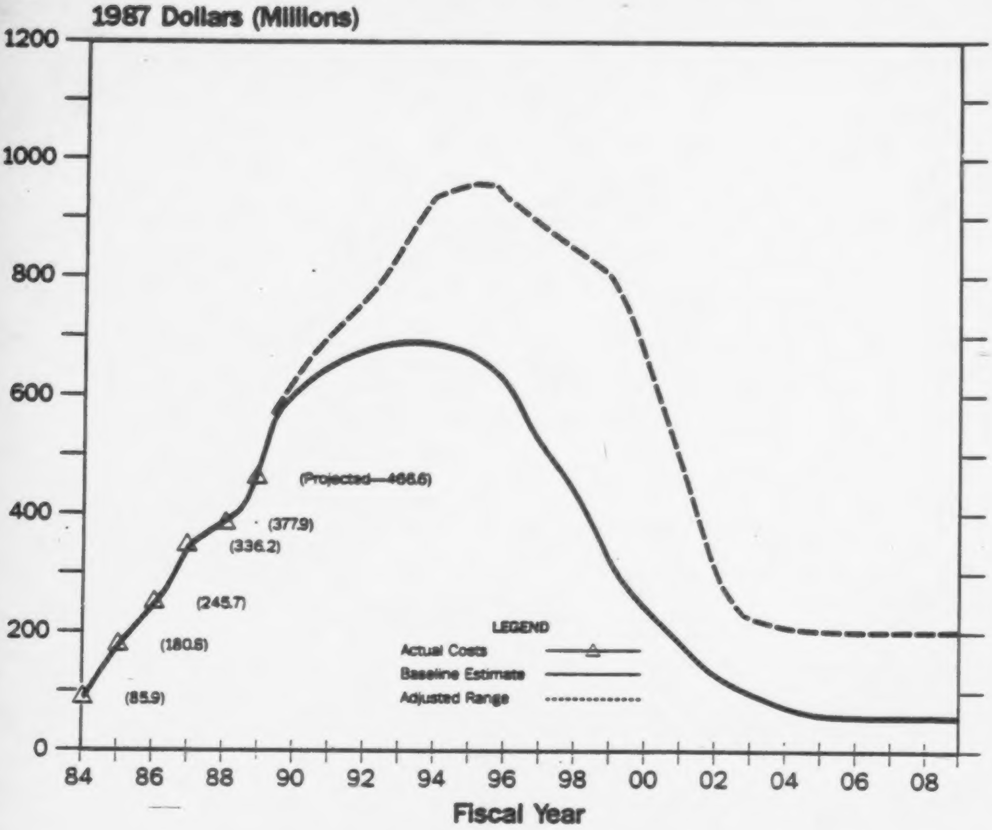
[15] The FY90 environmental restoration budget request of $517 million for Defense Department sites was held at FY 89 levels (plus inflation) despite previous plans to increase spending for environmental restoration to more than $600 million in FY 90. Also, the current estimates fail to account for the increased costs of using permanent remedies.

[16] The cost of cleaning up DOD facilities is estimated to cost approximately $9-14 billion, according to the Defense Environmental Restoration Program Annual Report, March 1989, compared to a total cost of $70 billion estimated in DOE's "2010 report" for its nuclear weapons sites.

FIGURE 2

Department of Defense
INSTALLATION RESTORATION PROGRAM COSTS



NOTE: These figures do not include costs of Other Hazardous Waste, or Building Demolition/Debris Removal activities or Rocky Mountain Arsenal, CO cleanup.

Source: Office of the Deputy Assistant Secretary of Defense (Environment), Defense Environmental Restoration Program, Annual Report to Congress for Fiscal Year 1988, March 1989, at I-22.

immediately. Third, cleanup should be accomplished in at least the same amount of time as DOE's planned modernization of the weapons complex, and thus spending must be ramped up substantially over the next few years. Finally, the overall defense budget (the "050" account), from which funds for cleanup and compliance will come, will likely remain static in real terms. Operating under these assumptions, there are a number of important steps Congress must take in order to secure adequate funding for cleanup and compliance.

1. Congress Must Halt Lower Priority Weapons Projects.

First and foremost, Congress must scrutinize the Department's budget to a degree it has never done before and root out lower priority production activities. The "2010 Report" indicates that DOE is unwilling or incapable of accomplishing this task. From the perspective of this committee it would seem that ensuring an adequate supply of tritium over the next several years and an adequate capacity to recycle safely the existing supply of weapon-grade plutonium in warheads and scrap is of considerably higher priority than new production initiatives to obtain additional weapon-grade plutonium and highly enriched uranium (HEU). Therefore, if there is to be adequate funding for cleanup and higher priority production initiatives, especially in an era of static defense budgets, Congress should cut or defer lower priority production activities.

There are a variety of lower priority nuclear weapons projects in DOE's FY90 budget request, including, but not limited to: construction of the second proposed new tritium production reactor (NPR) (any commitment to the first NPR should be deferred pending completion of adequate research and development on competing technologies and an assessment of START negotiations) development of nuclear directed energy weapons, modernization of the Fernald, Ohio weapons materials facility, renovation of existing plutonium and high-enriched uranium reprocessing facilities, restart of high-enriched uranium metal production, and construction of the Special Isotope Separation (SIS) plutonium plant in Idaho.

For example, DOE could save about $115 million in FY90 alone by halting or deferring construction of the multi-billion dollar SIS plant proposed for construction in Idaho. Last year, the House and Senate wisely put the brakes on DOE plans to construct the SIS plant, which would refine plutonium for use in nuclear weapons and could cost $3 billion or more to develop, construct, and operate. Serious concerns were raised about the need for and technological-readiness of the laser-based facility proposed for construction at the Idaho National Engineering Laboratory. Since the last Congress, the GAO has suggested that Congress reexamine the priority assigned to the SIS project.

2. Congress Should Increase DOE Environmental Funding for FY90 by $400 Million Over the Bush Budget Request

For FY90 the Bush budget request for environmental restoration of $400 million should be increased to $700 million. This money should be directed to making real progress with actual cleanup, as well as strengthening the technical foundation for future cleanup in the areas such improved environmental monitoring and laboratory capacity that we have outlined. In addition, Congress should provide $100 million for needed defense waste projects like waste vitrification projects at Hanford, and the Idaho National Engineering Laboratory.

3. Congress Should Allocate a Larger Percentage of the Overall Defense Budget to Cleanup.

Because the money saved from cutting low priority production projects and improving the efficiency of cleanup spending may not cover the full bill, DOE must be given a larger percentage of the overall defense budget for its environmental activities. DOE's staggering environmental problems are primarily the unpaid costs of supplying the Department of Defense (DOD) with warheads over the last several decades. As such, it is reasonable that DOD should shoulder part of the cleanup bill.

In fiscal years 1987 to 1989, DOE received about 2.5 percent of the 050 account to fund nuclear weapons production.[17] With an increase of just one-third of a percent (.33%) in DOE's share of this account, an additional $1 billion could be made available for cleanup and compliance. In this way, the total 050 account would remain unchanged but increased funds would flow to DOE for environmental programs. Congress would have to mandate that all funds generated from such an increase are allocated to cleanup and compliance, and not production activities.

4. Congress Should Disapprove DOE's Request to Reprogram Environmental Funds to Nuclear Weapons Production

The Energy Department's recent request[18] to reprogram millions of dollars from defense waste and environmental compliance projects reflects a continuation of the skewed priorities that has led to today's massive environmental problems. Existing environmental funding should be maintained to ensure completion of necessary projects. In those cases where funding remains after an environmental project is complete, the money should be used for environmental cleanup and compliance, not low-priority production activities.

5. Congress Should Direct DOE to Clarify Its Budget.

DOE's Budget Request has been improved this year, making it easier for Congress and the public to understand what cleanup activities DOE is undertaking. But DOE's improvements have not gone far enough. The Department's budget still does not clearly spell out how much is being spent on what DOE refers to as "Corrective Action" in its Needs Report. Essentially, this category includes upgrades to existing facilities to bring them into compliance with environmental, safety, and health standards.

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[17] U.S. Senate, Hearing Transcript, Senate Committee on Armed Services Subcommittee on Strategic Forces and Nuclear Deterrence (S. Hrng., 100-790 Pr. 6), March 1988, at 360. DOE's portion of the overall 050 account is designated the 053 account, while DOD's portion is called the 051 account. A small portion of the 050 account is allocated to other federal agencies for activities relating to civil defense, selective service, and the strategic mineral reserve.

[18] Letter from Elizabeth E. Smedley, Controller, DOE, to Representative Samuel Stratton, January 6, 1989.

The hundreds of millions of dollars of corrective action funds, which are currently spread out among DOE budget categories entitled "Weapons Activities" and "Nuclear Materials Production," should be consolidated in the budget and the specific projects at each facility listed.

6. Congress Should Support Legislation to Improve DOE Environmental Management and Compliance.

In light of DOE's environmental management problems, we strongly urge Congress to adopt a bill (H.R. 765) recently introduced by Rep. John Dingell (D-MI), and over 37 Democratic and Republican cosponsors, that would establish a temporary commission to make recommendations to the President and Congress regarding approaches to effective and efficient cleanups. We also urge Congress to enact H.R. 1056 introduced by Rep. Dennis Eckart (D-OH) which would increase the authority of EPA, states and citizen groups to enforce DOE compliance with the Resource Conservation and Recovery Act (RCRA).

Senator KENNEDY. There has been a reference to the DOE's current model in the testimony, and I think the comments that you have made on that have been very useful, albeit it rather troublesome. I do not know if you could provide for the record what alternative either you or others have recommended which would provide a more realistic kind of a model. Perhaps you could provide that as well for the record. We would appreciate it.

Mr. REICHER. We would be glad to, Senator.

[The information follows:]

ALTERNATIVES TO THE DOE'S RANKING MODEL (MEPAS)

Because of fundamental technical and policy problems, the Energy Department should cease using the Multimedia Environmental Pollutant Assessment System (MEPAS) model. In place of MEPAS, DOE should use EPA's Hazard Ranking System (HRS) to rank its waste sites. Although EPA formally proposed HRS as a screening tool rather than a ranking system, the HRS produces ranking groups that are comparable to those resulting from the MEPAS model published in the *Environmental Survey Preliminary Summary Report*. Also, unlike MEPAS, the HRS has been subjected to formal public notice and comment. Finally, EPA's recent "Listing Policy for Federal Facilities" requires that federal facilities be placed on the National Priorities List (NPL) if the HRS score warrants, regardless of whether the site is subject to RCRA authorities (54 *Fed. Reg.* 10520, March 13, 1989). Hence, both RCRA and CERCLA waste sites must be scored using the HRS to determine their eligibility for the NPL.

Regardless of priorities indicated by the HRS, DOE's ultimate cleanup schedule must be determined by appropriate federal, state and local regulatory agencies in compliance with applicable environmental laws and court orders. The Energy Department should be establishing environmental priorities outside the purview of legally established regulatory authorities. For example, DOE is obligated to comply with certain deadlines established by a 1988 Consent Decree for activities related to the closure of seepage basins at the Savannah River Plant. These deadlines cannot be changed on the basis of internal DOE priority decisions.

DOE has also developed another model—the "Program Optimization System" (POS)—for establishing cleanup priorities within the nuclear weapons complex facilities. POS has a fundamentally different role than MEPAS. Its purpose is to establish cleanup priorities given certain budget assumptions. It considers public health risk as well as regulatory requirement and community concerns. To the extent that POS depends on MEPAS for establishing baseline environmental risk, we are concerned about its reliability. But, the input for baseline environmental risk can be modified to use HRS scores. Regardless of the application of POS, however, it should be subject to formal public notice and comment in the same manner as the HRS and the Defense Department's ranking model.

Senator **Kennedy**. Thanks very much. We really appreciate all of your help.

I would yield the Chair to Senator Glenn at this time. Thank you.

Senator Glenn [presiding]. Thank you, Mr. Chairman.

I was out of the room for just a moment, and maybe you addressed this. My question was going to be on the environmental survey preliminary report.

Mr. Werner, you were a contractor on that study. You indicate in your testimony that occasionally you would participate in a "prioritization decision meeting at which numbers used in the MEPAS model would be developed based only on the speculation of the survey team members."

Can you elaborate on that? To me, that makes things of such dubious value, I would question whether we should attach any credibility at all to something that was developed in part or in whole on such a basis.

Mr. **Werner**. I share your concern, Senator. It is one of the prime reasons that we brought it up.

The prioritization of environmental problems is not a new issue. In the early 1980s EPA had to address this task and designed the Hazard Ranking System. EPA looked at a number of alternatives and came up with one that was much simpler than DOE's MEPAS model because they saw the need to get on with the cleanup job rather than just do paper studies.

The model that DOE came up with, however, is so cumbersome and data insensitive that we were left with no alternative but to sit around and, in some cases, just make up numbers to fit into the model.

Senator **Glenn**. How long does it take to come up with an alternate process if this one was flawed?

Mr. **Werner**. There are a number of ranking models already available that can be used. As we mentioned, EPA has a ranking system. They just revised and updated it to make it much more accurate. EPA's new model has gone out for public review and could be used for the waste sites.

Again, we have to remember that the only apparent use of DOE's model, that I can discern, is as an input to the Program Optimization System that you heard testimony on yesterday.

Senator **Glenn**. Do you have any lists of specific projects on which we could spend money right now to begin or improve cleanup efforts?

Mr. **Werner**. As we mentioned, we are going to develop a more specific list. But I can name a couple just on places where I have visited and walked around these sites and talked to the people who are working there. I have heard their frustration while standing at the landfill or over lunch.

For example, at the Oak Ridge Gaseous Diffusion Plant, they do not even have money to go out and look at their underground storage tanks. As you know, underground storage tanks leak over time, and there is a need to find out whether they are leaking and, if they are, pump out the product so that it will stop leaking and then pull the tank.

Senator **Glenn**. If you could give us a list of those, I would appreciate it. You do not have to do it right here this morning, but give us a list of those for the record if you can.

Mr. **Werner**. I would be glad to.

Senator **Glenn**. Also if you can, attach any specific money figures as to what would be required to get started if you have some estimates on that.

[The information follows:]

There are Specific Areas Where Additional Cleanup Funding Can Be Effectively Spent in Fiscal Year 1990

In recent hearings, DOE has claimed that it could not spend additional funds in FY90 if they were authorized. We believe, however, that significant additional cleanup work can and must be done. In addition to the general need to accelerate cleanup to achieve a reasonable level of activity in the 1990s, there are specific cleanup activities that require additional funding in FY90.

1. Interim Remedies

The lessons learned during the 1980s in the Superfund program should be applied to cleaning up DOE facilities. One important lesson was the usefulness of "interim remedies" i.e., remedies used to stabilize the spread of contamination and to reduce any short-term risks such as fire and explosion. Interim remedies are cleanup measures that can be taken now to halt or slow the spread of contaminants in groundwater and soil. Because of the overwhelming scope of cleanup needs at DOE facilities it makes a great deal of sense to employ interim remedies at some sites.

Perhaps the best illustration of the usefulness of an interim remedy is Times Beach, Missouri, where dioxin-contaminated soil was allowed to remain in ditches and on roads while the situation was being studied. Unfortunately, no interim action was taken and a summer flood spread the contaminated dirt into nearby streets and yards. EPA eventually bought the entire town for approximately $32 million and moved its residents to new homes. EPA is now planning a $100 million cleanup involving incineration of contaminated soil. The application of some well-chosen interim remedies might have prevented this terrible waste of a town and the consequent exorbitant costs.

Similarly, a large area located at DOE's Oak Ridge reservation in the flood plain of the Clinch River is contaminated with thousands of pounds of uranium. The cleanup of the site was to begin last year, but was deferred because funding was denied. Flooding of the Clinch River could wash a large amount of the radioactively-contaminated soil into the river and adjoining fields and forests, greatly increasing the cost of cleanup at this site. This is a classic example of where an interim remedy such as "hot spot removal" or a retaining wall by the river would avoid serious future problems.

The ground water at many DOE facilities is contaminated with radioactivity and organic chemicals (e.g., Lawrence Livermore National Laboratory, Fernald, Savannah River Plant, Hanford, Rocky Flats Plant). In some cases, the contamination has spread off site and contaminated residential drinking water wells. The spread of contaminated groundwater can be halted or slowed with the use of "counterpumping" strategically located wells. Also, "hotspots" of highly contaminated soil or sludge can be removed to eliminate the original source of the contamination thereby stemming its spread into the ground, air or waterways.

In addition to direct environmental benefits, interim remedies are likely to save money in the long-term by ensuring that the contamination does not spread before a permanent remedy can be implemented. The use of interim remedies has been recommended by the Office of Technology Assessment[19] and by private contractors with significant experience in the Superfund program.[20]

Although interim remedies can provide quick, cost-effective responses, there are three important considerations concerning their use: (1) interim remedies should not be used as a substitute for permanent remedies; (2) distinct decision-making processes should be used for the interim and the permanent remedies so that interested citizens will have an opportunity to comments on both phases;[21] (3) the implementation of an interim remedy should not interfere with any planned long-term remedy. For example, soil covers should be avoided in cases where subsequent exhumation of wastes might be necessary because excavation through this type of cover is more difficult and expensive. Such an interim remedy should also be avoided because it might serve as a disincentive for implementing the final cleanup.

2. Decontamination and Decommissioning

There are hundreds of DOE facilities contaminated with radioactivity and hazardous chemicals awaiting decontamination and decommissioning (D&D).[22] These facilities range in size and complexity from large production reactors and fuel reprocessing facilities to small laboratories and fabrication facilities. All of the facilities pose some potential hazard to the environment, and must be decontaminated and decommissioned.

Decontamination and decommissioning may be the biggest sleeping giant in the DOE budget. DOE estimates decontamination and decommissioning costs at approximately $3-4 billion.[23] The GAO, however, assigns a price tag of $15 billion to D&D.[24] Overall, we believe the costs will be far greater.

The FY90 budget request defers virtually all D&D activity by earmarking only $29 million for this multi-billion dollar program. At this rate, it would take DOE over a century (DOE cost estimate) and over five centuries (GAO cost estimate) to complete the D&D of the weapons complex.

In the few instances where DOE has considered funding D&D plans, costs have been consistently underestimated. For example, DOE estimated the D&D costs for all eight of the retired Hanford production reactors at less than $200 million total ($25 million per reactor).[25] This estimate contrasts sharply with considerable evidence from commercial reactor decommissioning showing the costs to be substantially more than $100 million per reactor.[26]

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[19] Office of Technology Assessment (U.S. Congress) Superfund Strategies. April 1985, p. 39.

[20] See e.g., testimony of William A. Wallace, CH2M Hill, and Gary A. Dunbar, CDM, before the Subcommittee on Commerce, Tourism, and Transportation, 1983, Ser. No. 98-128.

[21] Environmental Defense Fund, et al. Right Train, Wrong Track: Failed Leadership in the Superfund Cleanup Program. June 20, 1988.

[22] Rogers and Associates Engineering Co., Radioactive Contamination at Federally-owned Facilities, Prepared for the Environmental Protection Agency, RAE-23-1, June 1982 at 3-53.

[23] DOE Needs Report, DOE/EH-0079, at 31.

[24] GAO, Dealing With Problems in the Nuclear Defense Complex Expected to Cost Over $100 Billion, GAO/RCED-88-197BR, at 6.

Funding for decontamination and decommissioning must be increased sharply above the Bush FY90 request for a number of reasons. First, many of the facilities currently requiring D&D are over 40 years old. If DOE waits until buildings begin losing their structural integrity, it will have a crisis on its hands that could result in increased radioactive contamination. DOE recognized this potential in a recent report on reactor decommissioning:

> No further action would result in deterioration of the reactor building, potential release of radionuclides to the environment, and potential human exposure to radioactivity. . . .[27]

Accelerating the necessary D&D work on these buildings will reduce the threat of radioactive releases, and will save money over the long run.

Second, D&D efforts must be accelerated so that EPA and state environmental agencies can begin to assess the environmental threats posed by contaminated facilities. For example, DOE has acknowledged that the 105-KE fuel storage basin at the Hanford facility leaked a significant amount of radioactivity into the soil column immediately adjacent to the Columbia River.[28] The contamination has not yet been fully characterized, however, awaiting the D&D of the basin and the entire KE reactor. Similar instances of environmental contamination could be occurring at other sites, but because of the lack of D&D they have not yet been identified. Delays in decontamination and decommissioning at these sites may allow contamination to spread with higher cleanup costs resulting.

Finally, the number of facilities requiring D&D will grow significantly in the near future as DOE begins retiring outdated facilities. DOE has proposed eliminating nuclear production activities at three facilities: Hanford, Fernald, and the Rocky Flats Plant. Massive shutdowns such as these will result in more facilities that will need D&D. By 1995, approximately 350 production facilities will be available for D&D.[29] Upon completion of the shutdowns and phaseouts discussed in the "2010 Report", there will be still more facilities requiring D&D. It is important to make headway on current D&D requirements if there is to be any reasonable expectation of coping with future D&D needs.

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[25] DOE, Draft Environmental Impact Statement, Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington, DOE/-0119D, March 1989, at 1.14.

[26] GAO, NRC's Decommissioning Cost Estimates Appear Low, GAO/RCED-88-184, July 1988, at 3; and Pollack, Cynthia, Decommissioning: Nuclear Power's Missing Link, Worldwatch Paper No. 69, April 1986, at 26.

[27] DOE/EIS-0119D, at 3.7.

[28] DOE/EIS-0119D, at 3.4.

[29] Modernization Report, at 6.

3. Waste Site Cleanup

In addition to decontamination and decommissioning, the cost of cleaning up thousands of hazardous and radioactive waste sites will be the largest single category of environmental funding needs for the nuclear weapons complex. Although smaller funding areas such as interim remedies and research and development are extremely important, actual waste cleanup will be the primary task on which DOE must focus. DOE should be gearing up for this task by fully funding the cleanups that are ready to be completed, and performing the necessary investigations at the other sites so that it is ready to complete those remedial action without delay. In addition, DOE should at least include in its annual budget request adequate resources to cover the immediate environmental needs expressed by the professionals in its field offices.

Cleanup is occurring or is ready to begin at many facilities for which funding is required without delay. But, at most sites the necessary studies and investigations about the existing problems have yet to begin. These studies are not mere paper exercises but are a critical first phase of the cleanup. Dozens of monitoring wells must be installed, pumping tests of aquifers must be performed, hundreds or thousands of soil, water and vegetation samples must be collected and analyzed, and the feasibility of proposed treatment technologies may require testing on a pilot scale. The cost of a remedial investigation/feasibility study of a typical Superfund site is approximately $1 million. If DOE is to achieve a reasonable level of activity by the year 2000, as illustrated in Figure 1, then these necessary studies must be funded so that the cleanup is ready to occur.

Environmental officials at DOE field offices are required to submit annual requests for the funding they need for cleanup and environmental compliance through the so-called "A-106" process.[30] At many facilities the Bush Budget does not include enough funding to cover the requests made by professionals in the field offices. Table 3 shows the difference between the amount of funds included in the Bush budget and the amount requested by the field offices. For example, the Bush budget included less than half the amount of funding requested by the field office for the Oak Ridge National Laboratory in Tennessee ($32 million instead of $70 million). Also, the Los Alamos National Laboratory (LANL) requested $25.079 million dollars in FY90 for environmental restoration, but the Bush budget includes only $7.480 million for LANL. The total amount of the requests not met in the proposed

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[30] Section 3(a)(3) of Executive Order 12088 requires that federal agencies submit Pollution Abatement Plans (also known as Pollution Status Reports and Five-year Plans: EPA Form 3500-7). Requirements for complying with this Executive Order are outlined in OMB Circular No. A-106.

Bush budget is more than $88 million.[31] This total represents only the amount included in the A-106 requests, which we understand from discussions with EPA and DOE officials do not reliably include all of the real environmental needs of a facility.

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[31] Although the amount earmarked in the Bush budget for several facilities exceeds the A-106 request amount, the net difference is more than $43 million. This comparison can be misleading, however, since the funds dedicated to one site are not available to meet the needs of another site.

TABLE 3

COMPARISON OF DOE FIELD OFFICE REQUESTS
FOR ENVIRONMENTAL RESTORATION FUNDS WITH BUSH REQUEST
($ Millions)

Facility	Field Office Request[1]	Bush Budget[2]	Amt. (Needed) or Over Request
Kansas City Plant	10.3	2.236	(8.064)
Los Alamos	25.079	7.480	(17.599)
Mound	18.119	10.266	(7.853)
Pantex	2.9	3.501	0.6
Pinellas	0.4	0.7	0.3
Rocky Flats Plant	27.5	17.850	(9.650)
SNL-Alb.	3.7	3.650	(0.05)
SNL-Liv.	0.5	0.9	0.4
Fernald	13.562	23.0	9.44
INEL	43.999	46.488	2.5
Lawrence Livermore	11.563	11.563	0
Nevada Test Site	2.985	2.630	(0.355)
Oak Ridge Nat. Lab.	70.180	32.845	(37.335)
Oak Ridge GDP	19.488	14.0	(5.488)
Oak Ridge Y-12	29.5	47.9	18.4
Savannah River	58.060	56.168	(1.892)
Hanford	66.683	80.223	13.5

TOTAL REQUESTS NOT MET = ($88.286)
TOTAL ABOVE REQUESTS = $44.7
NET = ($43.5)

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[1] Compiled from Annual "A-106" (March 6, 1989 version) submittals from DOE field offices, Tom Zamora, Federation of American Scientists, Washington, D.C.

[2] Revised Congressional Budget Request, FY 1990, February 21, 1989.

4. Research and Development of Waste Cleanup and Waste Reduction Technologies

New technologies to clean up waste as well as to reduce the amount of waste being created need to be developed if DOE is going to manage its environmental problems effectively. For example, at many sites where DOE has estimated funding needs in the "A-106 submittals" for environmental restoration, the cost estimates have assumed the use of a method called "capping" in which a dirt or clay cover is placed over a waste site. This technique, however, has frequently been proven inadequate. The clay or dirt cap tends to fail because of erosion, burrowing rodents, and tree roots; precipitation infiltrates the waste site, and contaminants are carried into groundwater or surface water. This migration leads to more extensive and widespread contamination and results in higher total cleanup costs. In addition, a cap can get in the way of subsequent efforts to treat or remove the waste permanently.

DOE must develop permanent cleanup technologies to actually detoxify or eliminate the waste rather than merely covering it up. "In situ biodegradation" is an example of a promising cleanup technology that could provide a lower cost, permanent solution to many waste site problems. One application of this technology is now being field tested by the U.S. Navy in cooperation with Stanford University at the Moffet Naval Air Station in California using microbes to degrade hazardous solvents in soil. We are encouraged by the Energy Department's recent plans to be on the "cutting edge" of developing new cleanup technologies,[32] but it will have a big job to merely catch up to level of technical sophistication already attained by many government agencies and private corporations during the 1980s.

EPA has developed a program to assist private and university scientists in developing new cleanup technologies, which provides up to $3 million per project annually.[33] Similar assistance may be appropriate for developing cleanup technologies for DOE facilities where unique technical challenges do not offer a private developer adequate assurance of recouping an initial research and development investment.

Another critical area where more environmental research is needed is in reducing the amount of waste being generated by redesigning processes to make them more efficient and substituting less toxic products. For example, non-toxic, water-based parts cleaning solutions can often be substituted for organic solvents. In addition, substitutes must be found for chlorofluorocarbons (CFCs) -- chemicals known to destroy the earth's protective ozone layer. The Paducah and Portsmouth plants annually emit over 150 and 100 tons of CFCs, respectively. CFCs are also used in degreasing operations at many DOE facilities. Because CFC substitutes must often be painstakingly tested for each application to ensure that they will be effective, the research process may take months or years. Therefore, the process of finding substitutes must begin now.

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[32] Statement of Peter N. Brush, Acting Assistant Secretary for Environment, Safety and Health, DOE, Before the Subcommittee on Natural Resources and the Environment, Agriculture Research and Environment of the House Science, Space and Technology Committee, April 27, 1989, at 3.

[33] EPA, The Superfund Innovative Technology Evaluation Program: Progress and Accomplishments, A Report to Congress, EPA/540/5-88/001, February 1988, at 2-5.

5. Laboratories for Reliable Environmental Monitoring Results

We have significant concerns about DOE's ability to develop reliable environmental data. An adequate capacity to perform reliable environmental analyses will be vital to the design of an effective and efficient environmental cleanup program. DOE must significantly increase its available laboratory capacity if cleanup is to proceed in a timely and efficient manner. For example, DOE does not expect to complete characterization of the wastes in the Hanford single-shell tanks until 1998, in part due to a shortage of laboratory capacity. This delay could be reduced if funds for building laboratory capacity are increased in FY90 and following years. The General Accounting Office testified before a recent Senate hearing that DOE could use an additional $50-100 million dollars in FY90 for environmental monitoring.[34] Much of this additional environmental monitoring funding is needed for expanded and improved laboratory capacity.

DOE must also invest in improvements in its existing laboratories to ensure the reliability of the data used to support cleanup decisions. GAO has testified,[35] and based on our experience we find, that DOE places more emphasis on quality assurance and quality control (QA/QC) in its weapons production operations than in its environmental monitoring, and consequentially, serious QA/QC problems have occurred in environmental monitoring laboratories. For example, at several sites, samples that were intended to test the reliability of a laboratory's routine analytical procedures, were "flagged" for special attention. As a result, laboratory technicians knew that samples were intended for evaluating the lab's performance.[36] This special attention completely defeats the purpose of this QA/QC procedure. These problems may be partly related to the shortage of laboratory capacity. Technicians overburdened with routine analyses cannot carry out necessary quality assurance/quality control (QA/QC) reviews. Additional staff may be needed to cope with the increased QA/QC burdens.

Another recurring problem heard from EPA and state regulatory officials is the DOE facilities have greater expertise with analysis of radioactive than nonradioactive contaminants. For example, at several DOE sites a common problem was the failure to follow the standard practice of chilling water samples to prevent the volatile organic contaminants from evaporating.[37] Without following this procedure, it is not clear whether the sample results indicate uncontaminated water, or improper handling that caused the contamination to evaporate before the sample could be analyzed. Similarly, GAO found problems with groundwater samples at the Savannah River Plant including mislabeled sampling sites and poor sampling methods.[38] To remedy these shortcomings, DOE will need to expand the abilities of its laboratories to analyze non-radioactive contaminants such as organic solvents and heavy metals. Specialized instruments such as gas chromatographs, mass spectrophotometers, and atomic absorption analyzers will have to purchased. Until laboratory facilities are expanded and improved the pace of cleanup will be limited by DOE's ability to gather reliable data.

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[34] Statement of Keith Fultz, General Accounting Office, before the Senate Armed Services Committee Subcommittee on Strategic Forces and Nuclear Deterrence, April 7, 1989.

[35] Peach, Dexter and Keith Fultz, General Accounting Office, Testimony Before the House Armed Services Committee, Subcommittee on Procurement and Military Nuclear Systems. February 24, 1989.

[36] DOE, Environmental Survey Preliminary Report Los Alamos National Laboratory, DOE/EH/OEV-12-P at 4-118 (January 1988); DOE, Environmental Survey Preliminary Report, Kansas City Plant, DOE/EH/OEV-11-P at 4-65 (January 1988).

6. Monitoring Wells

Perhaps the single biggest environmental problem at DOE facilities is contaminated groundwater. Simply understanding the extent of this type of contamination can be an excruciatingly difficult task -- comparable to studying air pollution where you cannot see where the smoke stack is, which direction the wind is blowing or what is in the smoke. Literally thousands of new monitoring wells will be required. Each hazardous waste site requires a minimum of three monitoring wells.

At Hanford, where over 1,500 waste sites have been identified, DOE plans to install only about 50 monitoring wells per year over the next few years. At this rate it could take several decades or more just to install the necessary monitoring wells to say nothing of actually cleaning up the sites.

Such delays in site characterization and cleanup can contribute to the spread of contamination, and hence to higher overall cleanup costs. For example, at DOE's Paducah Gaseous Diffusion Plant in Kentucky, cancer-causing solvents were found recently in off-site drinking water wells. Had the placement of groundwater monitoring wells been accelerated at this site, the spread of contaminants would have been detected much earlier, possibly preventing this wide-spread contamination, with the direct result of a lower overall cleanup cost for this site.

7. EPA and State Oversight Funding.

Without adequate funding for regulatory agencies like EPA, many cleanups will be delayed due to backlogs in review and approval. For example, EPA's Region VIII office has stated that it will need to triple its Federal facility oversight staff just to keep up with the oversight necessary for the cleanup of the Rocky Flats Plant in Colorado. Similarly, we understand that the staff of the South Carolina Department of Health and Environmental control is understaffed and underfunded in its regulation of the Savannah River Plant. Once again, an increase in funding could prevent unnecessary delays in cleanup, delays which can lead to increases in overall cleanup and environmental restoration costs.

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[37] See e.g., Preliminary Survey Report, Pantex Plant, DOE/EH/OEV-06-P, September 1987, p. 4-61; and Preliminary Survey Report, Portsmouth Uranium Enrichment Complex, DOE/EH/OEV-04-P, August 1987, p. 3-72.

[38] GAO/RCED 88-197BR, at 19.

8. Construction of Defense Waste Treatment Facilities Needs to be Accelerated.

The DOE is currently in the final stages of completing a $1 billion high-level radioactive waste vitrification plant at the Savannah River Plant which will embed radioactive wastes in high-integrity, boro-silicate glass. This plant, known as the Defense Waste Processing Facility, will play a major role in easing the high-level waste problems at the Savannah River Plant.

Because of the important role that waste vitrification can also play in solving the critical high-level waste problems at the Hanford Reservation and the Idaho National Engineering Laboratory (INEL), DOE should be moving ahead on a rapid basis with the design and construction of vitrification plants at both of these facilities. Unfortunately, under current spending plans, a vitrification plant will not be operating at Hanford until the turn of the century. At the Idaho facility a vitrification plant will not even be under construction until after the year 2000. In fact, rather than using millions of dollars available from a completed waste storage facility at INEL to begin work on this new vitrification plant, DOE has requested that the money be reprogrammed to a new plutonium production plant in California.

Low-level radioactive waste disposal must also be better addressed. One example of a low-level defense waste facility for which funding should be increased is the treatment facility (referred to as the "Pond-crete Plant") used for stabilizing wastes from the solar evaporation ponds at the Rocky Flats Plant. This facility is part of the cleanup of evaporation ponds at Rocky Flats which received low-level liquid radioactive wastes as well as hazardous wastes including carcinogenic solvents, hexavalent chromium, and cyanide solutions. These solar ponds are leaking into the Walnut Creek drainage, which leads to the Great Western Reservoir -- the source of drinking water for the town of Broomfield (population 8,000). Approximately 17,000 batches of "pond-crete" were recently found to require testing and remixing because of problems with the ratio of concrete used initially. Hence, merely to maintain the original schedule, the treatment facility needs to be expanded and improved.

Senator GLENN. You had a discussion a little while ago with the chairman, Senator Exon, about our capacity for HEU production in this country. I believe you will find that Portsmouth in Ohio still produces HEU. It is not weapons-grade. We are not running it through the additional cycles to get it up to weapons grade. But we still have that capacity there. It is being used for some of the Naval reactors and for other purposes. So we do still have an HEU capacity in this country that is operating right now.

Mr. REICHER. That is right. I stand corrected. We have not produced HEU for weapons purposes since 1964.

Senator GLENN. Just another comment. Your point on the Soviets I think is well-taken, however, I do not think, at the same time, we would necessarily know how many reactors they have left, what is their stockpile of plutonium as compared with ours, how many weapons they are replacing, what is their source out of those weapons, compared to what is our source. Fifty different variables go into whether we could immediately follow their lead.

I also share Senator Kennedy's view that at least this is the time to push to see whether they will agree to certain production limits, and to determine whether we can do something similar. Can we also tie conventional arms into that discussion? Let us do all these things in encouraging the initiatives that Gorbachev is suggesting, even though we obviously cannot base our HEU and our tritium production on what the Soviets are producing.

On another subject, you mentioned the possibility of applying interim remedies to halt or slow the spread of contamination. Two questions about that approach. First, we still have prioritization problems with that. How do we go about prioritizing which sites deserve priority attention for interim solutions?

Mr. **WERNER**. That is a very good question. In fact, part of the answer is in the nature of interim remedies. One of the benefits of interim remedies is that they can be applied quickly, and they do not cost as much. You look to where you can put them in right away. I do not believe we will have much of a prioritization problem with interim remedies. It is not like we are going to have two separate cleanup programs.

The idea is to get out there quickly and broadly and stabilize these sites.

Senator **GLENN**. You cited the contaminated groundwater around X701B holding pond at Portsmouth in my own State of Ohio. Can you tell us a bit more about that site? In your letter when you provide us some other information, maybe you could give us an estimate, if you have one, of how much it would cost to clean that up and what you know about its contents. I would appreciate that.

Mr. **WERNER**. Sure.

[The information follows:]

COST OF INTERIM CLEANUP AT THE PORTSMOUTH X-701B SITE

Interim counterpumping at the X-701B Holding Pond was estimated by DOE to cost approximately $50,000 to $100,000. The range in the cost estimate reflects the uncertainty associated with distinguishing between the actual counterpumping operation and ground water monitoring costs. The cost of constructing approximately 70 ground water monitoring wells around the X-701B Holding Pond was much greater than the cost of the interim remedy. The counterpumping operation essentially involved lowering tygon tubing down a 4-inch monitoring well (well number BW-2) and slowly pumping from the bottom of the well (trichloroethylene is heavier than water). Regardless of exact cost of this operation, it is clear that a quick interim cleanup remedy is possible to remove the source of contamination and stem its spread at a fraction of the estimated average $20 million cost of completing a long-term permanent remedy at a hazardous waste site.

Mr. **WERNER**. X701B is an old pond that was used for discharge of what is called raffinate solution, which is mainly nitric acid with uranium and trichlorethylene in it. The pH is often less than one; very, very acidic.

One of the interesting things actually at X701B that we found was that one of the wells nearby that was sunk by another contractor had over a foot and a half thick layer of pure trichlorethylene in it. This is something that I was alerted of when I found out that the groundwater was completely saturated with trichlorethylene.

This seems like it might be an opportunity to apply counterpumping to halt the spread of contamination until we can figure out what we can do later on.

Senator **GLENN**. If you have any information on that, please provide that as well.

You also mentioned the idea of a commission to look at the cleanup situation and make recommendations about solutions. Some claim we do not need another commission to examine the problem. Would you expand on that?

Let me just say the typical Washington answer to a problem is to form a committee or a commission or a council and you actually wind up with a hydraheaded nothing; the horse that was built by the committee is a camel.

On the other hand, we had the safety board that I took the lead in trying to get through and that we passed through this committee and which was finally enacted. I think the board was a good step in creating an outside oversight group to look at DOE. DOE had been laggard in this area for 35 to 40 years. So occasionally there is a requirement, I think, for an outside board, commission or council of some kind, especially when there is a major problem not being dealt with, to look at that problem and give outside advice until we get the thing straightened out and on track.

With that as context, do you think we still need a commission, a council or some such body to look into the cleanup and make recommendations about it? Secretary Watkins has said he is on top of this thing. Starosteki, Wade and the others at DOE are right with him.

Please bear in mind my comments earlier that saying something from the bridge of a ship does not mean that the ship changes direction for a while.

Mr. REICHER. I think that there is great wisdom in a short-term commission that would take a look at the cleanup problem. We had some very valuable advice rendered by the Roddis panel, which looked at the N-reactor at Hanford; by the National Academy of Sciences panel, which looked at all the production reactors; by Mr. Ahearn's advisory committee to the DOE Secretary, and now by your board, Senator Glenn.

That has all been on the safety side. There has not been an outside look at the environmental side, and as a result the information and analysis that we have is mostly developed internally. We have not used the best minds available on an equally serious problem.

So I think it is important that we move ahead with this commission, realizing that it is short term. I think it would serve a great purpose.

Senator GLENN. Just one more thing. Could our safety board be enlarged to do this same thing, to give it the additional responsibility of examining the cleanup problem? It is a board in existence. It would be much easier to give it the additional responsibility than it would be to form a new board or commission.

Mr. REICHER. I think that would be worth looking at. You could move it from what is essentially a safety board into a board that looks also at environmental problems. The question is whether you are going to be asking it to do too much. That is a serious issue, but I think the possibility deserves some serious consideration.

Senator GLENN. Thank you. This has been good testimony this morning. Thank you.

Mr. REICHER. Thank you, Mr. Senator.

Senator WIRTH [presiding]. Thank you very much. I would just join my colleagues in saying what a terrific job you all have done, and we look forward to working with you on all of this.

Let me start in my own backyard. Have you been to Rocky Flats, Mr. Werner?

Mr. WERNER. Actually, that was not one of my sites.

Senator WIRTH. Do you have any data on Rocky Flats?

Mr. WERNER. We have some. I did do the technical peer review on Rocky Flats, but it helps to be there. I was the contractor on the environmental survey program. We went out to each of the 38 sites, and I did 9 of them. Because I was one of the few people who stuck it out for the whole contract, I was asked to do technical peer review on a lot of the other sections that other people had prepared, and that was one of mine.

Senator WIRTH. The recommendation has been made that in the long term Rocky Flats be moved, right?

Mr. WERNER. That is what I understand from the 2010 Report.

Senator WIRTH. Given what you know, if Rocky Flats were to be moved where would it go?

Mr. WERNER. I think the question about where it should go is a lot harder than saying that it should be moved. I come at it from an environmental point of view. I am not a weapons production expert at all.

There are a lot of facilities such as Rocky Flats, it seems to me, that were built at a time before we knew a lot about the hazards of the site, and now we find that the hazards are greater and that the populations are encroaching.

Senator WIRTH. I am very familiar with that. I understand that. The question is where do we go from here? I do not know a lot of States that are clamoring to receive facilities, or maybe they are and I have just not caught wind of that. Do you know, Mr. Reicher?

Mr. REICHER. Not many, Senator. We are not in a position to suggest that Rocky Flats ought to move, but I think we are in a position to call, as we have, for a more comprehensive public review of the whole weapons complex.

Senator WIRTH. That is exactly right.

Mr. REICHER. We called on DOE to do that in the form of a programmatic environmental impact statement. Mr. Senator, you and a number of other Members of Congress sent a letter in support of that, and we are hopeful that DOE will——

Senator WIRTH. I agree with that, and I think we ought to start somewhere.

You know, we are going to end up with not only an enormous cost of, as you point out, potentially more than the Vietnam war or $2,500 per family. It makes even the savings and loan crisis look small.

Mr. REICHER. That is correct. I just do not think that we are——

Senator WIRTH. The answer to picking this up, you do not sort of back up Allied moving vans to Rocky Flats and decide you are going to take it to a warehouse someplace else or to Portsmouth or wherever it may be.

Mr. REICHER. What is clear is that we can and should downsize the complex. There are things that are being done that no longer have to be done, and in combination with an agreement that we might potentially reach with the Soviets to reduce or eliminate the production of certain materials, we could actually be at a point where some of this move would not even have to occur.

Senator WIRTH. Let me just go right to those points. There are things that are currently being done that do not have to be done any longer. Do you have a list of those? Do you have an analysis of that?

Mr. REICHER. We did a preliminary analysis with a couple of other groups on that issue. We presented that to the Senate Budget Committee, and we can make that available to you.

What we basically did was outline two alternative scenarios to the current fiscal year 1990 budget in which certain production activity, certain weapons development activities were reduced or eliminated, and as a result we were able to generate in those scenarios an additional $1 billion for cleanup.

The first scenario was strictly within the DOE. The second scenario was a combination of DOE and about a $250 to $300 million infusion from the Department of Defense. It was a preliminary cut. It is controversial, but I think it is a start. It is the sort of alternative analysis that we think ought to be going on now in the form of not only a programmatic environmental impact statement but just a broader public discussion of the whole future of this weapons complex.

Senator WIRTH. I think that is exactly right, and the timing seems to be propitious for that, too. With all of the changes going on in the Soviet Union and our relationships with the Warsaw Pact and a new administration in town and so on, it would seem to be an ideal opportunity for getting that kind of a review under way.

What do you know about the reaction or responsiveness of the Department of Energy or the White House to the idea of that kind of a review?

Mr. REICHER. With respect to the programmatic environmental impact statement, we got a letter from DOE which explained that they thought that that sort of a document was premature in view of the fact that Congress and the DOE were still addressing this issue, which to me turns the whole process upside down.

The intent of the National Environmental Policy Act and the environmental impact statement process is that you begin early and you use it as a decisionmaking process and as a decisionmaking tool. We think that basically the Department of Energy is incorrect that it is premature, we believe that the Energy Department ought to begin this process right away.

There are a number of virtues. One is that you do go out to the public and solicit comments. Number two, you go out to other interested Federal agencies and solicit their comment. We have to hear more formally from EPA. We have to hear more formally from other Federal agencies and, I should add, from State agencies.

The environmental impact statement requires a look at all reasonable alternatives. One of the problems with the 2010 Report, besides the fact that it was done in a classified way, is that it really is not looking at alternatives to the plan that it laid down for the future of the weapons complex. We need to be exploring alternatives for downsizing the complex, for getting rid of redundant facilities, beefing up those production initiatives which are deemed very critical and cutting back on those which are not. That is the virtue of a process like an environmental impact statement.

Senator **Wirth**. I agree with that. It would seem that you would want to do that before you come to decisions in the Congress and the executive branch rather than the other way around. That is what you are saying.

Mr. **Reicher**. That is right.

Senator **Wirth**. On page 10 of your testimony you talk about phasing out low priority programs, and in that you focus in particular on the SIS. What are other low priorities?

Mr. **Reicher**. There was the resumption of the production of highly enriched uranium for weapons which I am not sure whether it is included in the fiscal year 1990 budget but there is talk about it in later budgets, and that would be resuming production at Oak Ridge, TN.

That is one of the areas where we could save some money.

Senator **Wirth**. Do you have other examples?

Mr. **Reicher**. Other examples include the modernization of the Fernald plant. DOE is proposing to spend several hundred million dollars modernizing a plant that, at least according to the 2010 Report, will be phased out or may be phased out fairly soon. So there is serious question about whether we should be pouring that kind of money into a plant like that.

We could also begin to look at certain weapons systems, such as nuclear energy directed weapons.

The second new production reactor, incredible savings there. Just the construction and development costs are somewhere between $3 and $4 billion, and those are likely to escalate, and then there is a very high cost for operating the plant.

Senator **Wirth**. Is that in the budget this year?

Mr. **Reicher**. There is money in the budget for both reactors for both R&D and construction.

Senator **Wirth**. Can we get a list from you? It sounds as if you have presented that to the Senate Budget Committee. When did you give that to the Budget Committee this year? When did you make that presentation?

Mr. **Reicher**. A couple of weeks ago.

Senator **Wirth**. I am a member of the Budget Committee as well, and I am sorry I was not there at that time. We can get that testimony from you, and can we get from you what you think are the items that can be eliminated from the budget this time around?

Mr. **Reicher**. Yes.

[The information can be found on page 117.]

Senator **Wirth**. That leads to the bigger question. Where are we going to get over all $100 billion plus? Where is it going to come from?

Mr. **Reicher**. Clearly, cutting out low priority weapons projects is not going to get us all that we need, and in that regard we are going to have to look to the larger DOD budget. An additional one-third of 1 percent of the DOD budget allocated to weapons cleanup would mean about an additional $1 billion per year. I think that it is high time that the Department of Defense, the receiver of all these weapons systems over the years, begins to assume some of the responsibility for the cleanup of the mess that has resulted.

Senator **Wirth**. Did you say at that rate it would take you until the year 2140 or something, is that not right? Is that your figure? If you proceed at that rate we will not get it cleaned up until 2140?

Mr. **Reicher**. Yes. At the current spending rate it will take not the next century but well into the following century. We clearly have to increase the spending, and I think the combination of the Department of Defense increasing its share and eliminating lower priorities projects, as well as looking outside the weapons complex may be fruitful.

Senator **Wirth**. What do you all know about the size and scope of other environmental issues that the Department of Defense faces?

Mr. **Werner**. By comparison, the environmental problems at Department of Defense facilities as a whole is considerably smaller. The most recent estimates are more on the scale of $25 billion compared to $100 billion estimated for DOE facilities. Of course, DOD does not have the same kind of decontamination and decommissioning problems that DOE facilities do because they do not use radionuclides in the same way.

Senator **Wirth**. You cannot be sure about this sort of thing, but do you think $25 billion is reasonable?

The reason I am asking is we had testimony last year from the Department of the Army, and the general in charge of their environmental programs said that the environmental issues in the Army and the Defense Department were a "disaster". This was unsolicited, it just came out. He was sitting right where you are.

Mr. **Werner**. That is interesting. Well, it does seem that all the cost ships seem to be rising on the same tide, and so if the initial estimates are $25 billion and somebody else is estimating $100 billion, they will both probably be higher, but I do not think there is going to be a big difference in how fast they rise.

Mr. **Reicher**. We made one point, Senator, when you were not here about decontamination and decommissioning, which is the cleanup of radioactively contaminated buildings and reactors. We made the point that this is really the sleeping giant in the DOE budget. DOE has only estimated $3 to $4 billion for taking care of all of that across the entire weapons complex.

GAO has estimated about $15 billion, and we think that those numbers could go up substantially. In the budget there is only $29 billion in fiscal year 1990 allocated to decontamination and decommissioning.

Senator **Wirth**. One of the things we might want to think about is having some kind of a requirement that goes into any piece of legislation that says nuclear on it that has a decommissioning cost factor that says if you are going to build anything or take any steps, you have got to include the cost of decommissioning in that.

Mr. **Reicher**. That has, in fact, been a great debate in the commercial nuclear industry about how and whether to charge ratepayers for the eventual decommissioning of nuclear power plants. I think that the DOE has not faced up to that even to the extent that the commercial nuclear industry has.

Senator **Wirth**. What do you think of Brock Adams' idea for a trust fund?

Mr. **Reicher**. We are still looking at that proposal at this point and have not reached an opinon on it. I think there are some good elements to it, and the way that it draws on a variety of sources for cleanup funding makes sense. The idea that you begin to load in cleanup funding over time makes a lot of sense rather than having to go year-by-year and scraping for whatever you can get.

We need to be loading up at the front end of this cleanup process if we are ever going to reach the $3, $4, $5 billion a year that it is going to take to resolve this problem in any kind of reasonable timeframe, 20 or 30 years.

Senator WIRTH. We are talking about decommissioning of plants. It seems to me that we can assume that there is some probability that we will have a lot of weapons coming back from Europe in addition to what happened in the INF Treaty, that either obsolescence or a treaty or both are going to bring a lot of weapons back to the United States.

Do we have the facilities here for taking those apart, for demilitarizing those, for decommissioning those weapons, do you know?

Mr. REICHER. All that I know is that we do disassemble them at the Pantex plant in Texas. As far as the materials contained in the weapons such as plutonium, I do not know that we have the capacity to destroy that material, if that is what you are asking; or are you asking about cleaning up the components of the warhead itself?

Senator WIRTH. Rocky Flats does a lot of that, bringing back the plutonium and reconfiguring that plutonium presumably. Then attempting to clean up the weapons, that gets done at Rocky as well. That is unique, is it not? Nobody else can do that sort of thing. So Rocky or its equivalent is going to be there for some time.

What I am thinking about is then what happens to the engines and all that sort of equipment from these weapons?

Mr. REICHER. If it is radioactively contaminated, much of it would probably be buried as we do with nuclear subs that are decommissioned. When they are decommissioned, frequently the radioactive components of the subs are removed and transported to Hanford where they are buried.

Mr. WERNER. Let me just add briefly to that. When the weapons resulting from the INF Treaty came back from Europe, a lot of the delivery vehicles were disassembled, and it seemed like we are straining our capacity for burning up the propellants or destroying the weapons to some extent. There was at least some brief controversy about where that was going to happen.

There is some information from the Congressional Research Service that might be available to you on that. I think you are making a good point that we should prepare for decommissioning weapons down the line when we have treaties resulting in elimination of even more weapons than INF.

Senator WIRTH. It seems to me in all of this it is pretty clear that we have placed a much, much higher priority on weapons modernization than we have on what do we do with all the current stuff; is that right?

Mr. WERNER. That seems true, sir.

Mr. REICHER. That is clearly the problem, and it is clearly what has gotten us where we are. That is what has to change.

I am hopeful that the new Secretary of Energy will make those changes in the new administration. We are concerned that the costs are simply going to continue to escalate and we may never catch up.

Senator **Wirth**. You do not have any specific data on Rocky Flats? We went through that. You have not been there. You have no specifics, going back to Senator Glenn's question, about what could be done this year, what funding ought to be in the budget this year that relates to Rocky Flats?

Mr. **Werner**. With one exception that I think is fairly well known from EPA. There is a need for a diversion to prevent runoff of contamination from going into a nearby reservoir. We are not talking about a terribly high tech solution here dealing with radionuclides. We are talking about earth moving and gravel bedding and things like that.

Mr. **Reicher**. The additional point we made in our testimony was the need of the regional EPA office for more staffing simply to do the regulatory work that needs to be done to get on with the cleanup at that facility. That is a critical problem not only in EPA but in State government even more so. They are just understaffed and cannot keep up with the sort of oversight that has to take place.

Senator **Wirth**. We got pretty much agreement from the Department of Energy yesterday that at least those two problems existed, the diversion for Great Western Reservoir and the fact that there was no funding available for doing the sort of planning and setting up of long-term cleanup of Rocky Flats. Nobody had the capability even to do that.

That is pretty discouraging if you look at the size and scope of the problem, that we are not funding that even enough to do the kind of planning that ought to be done.

What do you know about the health side of this? We have talked about the facilities side of it, and it seems to me that there may be another sleeping set of issues out there in terms of health impacts on workers who have been working in the complex.

I continue to hear over the transom and you talk to the guys that work there and so on, I continue to hear a reflection of a good deal of unease about what impacts they have had and the fact that they have not been given the straight scoop. I always have trouble sorting out whether or not that is a natural fear that people who work in these plants would have; but because it gets greater with each passing sort of 6-month period of time I become increasingly convinced that there is probably some fire where they suggest that there is smoke.

Mr. **Reicher**. I think that that may be true, and the problem is that we do not have all the data that we need, and we do not have all the analysis that we need, and we do not have enough independence in whatever analysis that we do have.

There is a battle going on right now as we speak over access to data that DOE has collected over the years that a group of very eminent epidemiologists and health physicists want to get their hands on but they cannot. They have substantial funding from the Three Mile Island Public Health Fund and are ready to go to work and are having trouble getting the data they need to do the epidemiological work. That would be a start, Senator, for getting a better understanding of how grave the health consequences really are.

I also think that shifting responsibility for epidemiological work out of DOE and into another agency would make a lot of sense.

Senator **Wirth**. Why not do legislation on that?

Mr. **Reicher**. Pardon?

Senator **Wirth**. Why not do that transfer legislatively?

Mr. **Reicher**. I very much support it. I think it is something whose time has——

Senator **Wirth**. We have been trying that every year for the last, I think, 7 or 8 years and met with resistance every time saying that is not proper, or HHS or NIH or the National Cancer Institute or whoever does not have the capability to really understand what goes on in the Nuclear Weapons Complex.

I say that is not the issue. The issue is to understand what the impact may be on the people who work there. That is what we are after, and presumably that is what the Cancer Institute or HHS over all is supposed to do. So we will try again this year.

Mr. **Reicher**. We need to develop the expertise and, furthermore, implement that expertise in a way that is independent.

Senator **Wirth**. Independent of the people who are making the weapons.

Mr. **Reicher**. I think if DOE is going to reestablish some measure of credibility with the public, these are just the sorts of things that are going to have to happen. Otherwise I think there is going to be a lot of suspicion.

Senator **Wirth**. Finally, I know Senator Kennedy asked a little bit about the potential of a treaty with the Soviets on weapons grade plutonium. I gather you are working with his office on language for such an approach; is that right?

Mr. **Reicher**. There are a number of organizations that have been working with Senator Kennedy and have been working actually since 1987. It is a coalition called the Plutonium Challenge. We launched our effort in 1987, calling on the President and Secretary Gorbachev to reach a bilateral halt to the production not only of weapons grade plutonium but also highly enriched uranium.

We are glad to hear that legislation may soon be introduced that would move us toward that sort of an agreement. The time is right for it, and I think as a result of the announcement today by Secretary Gorbachev about highly enriched uranium and plutonium production, there is a positive signal from the Soviets.

What is important to note is that we explored that possibility with the Soviets in the 1960s. They raised the possibility with us in the 1980s, and now we are probably at a point where both countries could profit from it bilaterally.

Senator **Wirth**. There seem to be two barriers to this. One is that we do not really know what they have, they do not know for sure. Well, presumably that is what the process of negotiation is, is to find out what the other guys have, and unless you decide you want to negotiate you cannot find out what the other person has.

You have to keep going around that circle, and you are going to keep spinning around getting nowhere, but you have to say, hey, we have to start that negotiation in order to find out and solve the problem.

Mr. **Reicher**. Find out whether you can find out.

Senator WIRTH. That is right. The other problem that is raised over and over and over again is the tritium issue and that we have to have more tritium in order to maintain the current weapons.

Is that the other barrier that is raised on a steady basis?

Mr. REICHER. Tritium is a separate story and would not, as I understand it, be addressed in the legislation that may be introduced.

I think the place to start is with highly enriched uranium for weapons and plutonium and set aside tritium for now. But there are perhaps ways of——

Senator WIRTH. There are ways in terms of a linear accelerator to produce the tritium where you do not have to get into the reactor. Is that right?

Mr. REICHER. Yes, that is a possibility. The Brookhaven National Laboratory has advanced that as a potential source of tritium. The question is whether the technology is capable of it and how long it would take to put on line.

Again, those are just the sort of issues that need to be explored fully before we make any substantial commitment to any new production reactors and certainly any commitment of funding in fiscal year 1990 to construction.

Our view is that we should be making no commitment to construction in fiscal year 1990 of any new production reactor. To the extent that there is going to be funding, it should be only for R&D work.

Senator WIRTH. I will be dropping the legislation related to the transfer of the health capability in the next couple of weeks and joining with Senator Kennedy on the legislation related to the potential treaty with the Soviet Union which I think will be introduced in the next few days. I will be joining with him on that.

I would look forward to working with you on these issues of priority. I just cannot agree more about the need to get this up the line. Unfortunately, it is much easier and probably politically sexier in some communities to talk about modernization of Lance missiles or Midgetman versus MX or both or railbasing and all that kind of good stuff without thinking about these enormous costs behind which continue to get too little attention.

You all have been terrific in helping to get the attention for this that it needs.

Is there anything else that you would like to add for the good of the order?

Mr. REICHER. The only additional point is that we do have a health physicist on our staff who is looking at a draft of the legislation that you may introduce, and we will be having comments on it. Overall, when I talked to him the other day he was very supportive of it.

Senator WIRTH. Tell him we are about to get to that point. I think we have gotten everything from you all, but if there is any more please tell him we look forward to hearing from him.

We thank you all very much. As ever, NRDC does a notable job, and we appreciate it. Thank you.

Mr. REICHER. Thank you very much, Senator.

[Questions for the hearing record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR STROM THURMOND

Senator THURMOND. Mr. Fultz, your testimony takes no issue with the methodology that the Department of Energy used to identify its environmental needs. Should the Committee read that as disagreeing with the testimony of the NRDC witnesses who claim the methodology is flawed?

Mr. FULTZ. At this point, GAO cannot agree nor disagree with NRDC's statement that the methodology—the MEPAS model—used by DOE as one tool to identify its environmental needs is flawed. We have not reviewed the model or its application to the decisionmaking process for the fiscal year 1990 budget.

Senator THURMOND. Mr. Fultz, as I read your testimony, you take no issue with the Department of Energy's identification of needs, or preliminary costing. Rather you fault the lack of a specific plan of action. Is this a proper reading of your position?

Mr. FULTZ. I do not believe that it is a proper reading of GAO's position on DOE's identification of needs or preliminary costing. First, we have stated in several hearings over the last month or so that for its environmental problems, DOE is still trying to identify the problems, determine the extent of contamination, and decide on the course of action to cleanup the contamination. Therefore, they more than likely have not identified all the problems and additional cleanup issues may surface as this work progresses. In addition, we have pointed out that DOE's 2010 plan puts modernization on a faster track than environmental cleanup. In the year 2010, DOE will have a refurbished weapons complex, but it will take many more years to complete the cleanup effort.

In regard to cost, we have reported that environmental cleanup will cost between $35 billion and $65 billion. However, this estimate is not budget quality and all indications we have seen are that the cost will increase. The Secretary of Energy recently testified that these estimates were speculative and indicated that the actual cost may be lower. We agree with his use of the term "speculative", however, we have not seen any information that shows the cost will be substantially lower than the estimates already made public by the DOE. DOE's studies and reports contain cost estimates that are generally comparable to estimates contained in GAO reports.

Senator THURMOND. Mr. Fultz, your testimony with respect to fiscal year 1990 budget levels for cleanup seems to put you in the camp with other witnesses who have testified that we need to understand, prioritize, and plan our cleanup activities before we can effectively apply more money to the task. Is this the case, and how do you respond to the testimony of the NRDC panel this morning that the percentage of the DOE funding going to cleanup is too small?

Mr. FULTZ. We have recommended that a cleanup plan is needed to provide Congress with information on which to make budgetary and programmatic decisions. However, we have also stated that there are some areas where DOE could effectively spend additional funds.

We have testified that the level of funding requested for fiscal year 1990 reflects the fact that DOE is still in the process of determining the extent of the environmental contamination at its facilities. According to DOE budget information, about 60 percent of the funds requested for environmental cleanup are for studies to assess and characterize the environmental problems. According to DOE officials, these studies are a prerequisite to developing long-range cleanup plans with state governments and EPA.

Key decisions, made by DOE together with state governments and EPA, on the level of cleanup at many of these facilities may be years away. According to DOE officials, establishing cleanup standards pursuant to environmental laws for many facilities may take as long as 5 to 7 years. In addition, in some cases, new techniques and technologies will have to be developed and implemented to address unique cleanup situations existing at many of the sites. Clearly, expenditures will likely increase dramatically in the next few years to fund large-scale cleanup projects. Some cleanup is being accomplished today, but the bulk of the cleanup effort is still years away.

For these reasons, we would not recommend large increases over and above the DOE request for fiscal year 1990. This does not mean that we believe additional funds could not be effectively spent. For example, increased funding for further site characterization—such as the installation of additional monitoring wells—on the order of $50 million to $100 million would help DOE to decide more quickly on the appropriate cleanup methods and then to actual cleanup. Additional funding could also be used for research and development into new cleanup technologies which have the potential to reduce costs or cleanup contamination for which there is currently no cleanup method available.

We have not studied all the recommendations NRDC makes in its testimony—such as the interim remedies which might halt or slow the speed of contamination. However, we do support their position that more money can be spent on monitoring, quality assurance and quality control, and research and development.

Senator THURMOND. Mr. Fultz, can you recommend to the committee what course of action should be taken to accomplish the kind of long range planning that should guide the cleanup and modernization of the weapons complex?

Mr. FULTZ. There are a number of activities that could aid DOE's long range planning effort. First, in March 1987, we recommended to the Secretary of Energy that DOE develop a comprehensive strategy that sets forth the projected facility requirements for continued nuclear weapons production; a comprehensive picture of the environmental, safety, and health issues facing DOE; and solutions to resolve them. The strategy should provide a comprehensive picture of what DOE's nuclear defense complex will look like in the year 2000 and beyond, and provide a road map of how we get from here to there. We believe that the 2010 plan recently issued is a beginning. However, it did not provide a road map for how we get from 1989 to a completely refurbished complex in the year 2010. It also provided no details on when cleanup of existing contamination would be complete. We believe such a road map is still needed. In that regard, the following are several issues that DOE should consider as they develop and implement long range plans.

—DOE should put into place as quickly as possible agreements with States and EPA on cleanup. While at this point these agreements may not address what cleanup standards will be used or what cleanup technologies may be applied, it will provide a framework and specific milestones for getting to those important decision points.

—DOE should provide the Congress with an annualized budget. Again recognizing this may change as more information is known, it will provide Congress with estimates to judge the pace and direction of the cleanup effort as well as understand when large increases in funding will be needed.

—Management should clearly define accountability for ensuring that key milestones both on modernization and cleanup are accomplished. For example, strong leadership from top management within DOE will be critical to effective implementation of any long-range plan. This is an area that Secretary Watkins has indicated he plans to address.

Senator THURMOND. Mr. Fultz, are there gaps in our knowledge or understanding that would prevent the formulation of a rational cleanup and modernization plan—with associated annual funding requirements—in the near future?

Mr. FULTZ. I do not believe that there are any gaps in knowledge or understanding that would prevent DOE from formulating a cleanup and modernization plan, with associated annual funding requirements, as soon as possible. It must be recognized, however, that this plan would have to be a "living document" which is modified and updated as new information becomes available. For example, at many sites, decisions about what cleanup method will be used is years away. In other cases, cleanup methods are not yet available for a particular type of contamination. Therefore, as more information is developed, cleanup priorities or need for funding may change.

We have recommended such a strategy which would address both modernization and environmental cleanup and include milestones, cost estimates, and cleanup procedures. This type of strategy would provide the Congress with the necessary information to make important programmatic and budget decisions necessary to cleanup and modernize the complex. While all the information is not available on the method by which many sites will be cleaned up or the extent they will be cleaned, the strategy should provide the details on how and when DOE will make those types of determination.

[Whereupon, at 11:12 a.m. the hearing was adjourned.]

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